IMPACT OF ARTISANAL GOLD MINING ON THE ENVIRONMENT: CASE STUDY OF WARD 22 OF CHEGUTU DISTRICT

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A research submitted in partial fulfilment of the requirements of a Master of Science Degree in Peace and Governance

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Date Submitted: 15 November 2018
Dedication

I dedicate this dissertation to my family; my wife Emeliya, daughter Tendai and the boys Tarisai and Isheanesu. I owe it to them for being away from them for the long time as I was pursuing my studies. I thank them for being steadfast in their support. May the Lord continue to give them strength and wisdom.
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Abstract

This study investigates the impact of artisanal gold mining (AGM) in Ward 22 of Chegutu District. The study was guided by the sustainable livelihoods theoretical framework (SLF). The case study design was used and data collection was done by means of content analysis, observations and in-depth interviews on respondents who were selected using purposive sampling. The respondents were drawn from gold mining sites in Ward 22 of Chegutu District, community leaders and the Environmental Management Agency (EMA). From the study it was observed that AGM was a major livelihood economic support activity for the people in Ward 22 and Chegutu town. Two forms of AGM existed in Ward 22; namely alluvial and reef gold mining. From the data collected during interviews and observations it was established that AGM could not be separated from environmental degradation. Alluvial gold panning was the worst cause of environmental degradation which was mainly in the form of land degradation, water pollution and deforestation. The research found out that AGM in Ward 22 was a major employer and that most of those who practiced it did not care about conservation of the environment except for one mine at Gadzema. This lack of care was attributed to high input costs, bureaucracy and lack of political will which made it difficult for the common miner to get registered. Most of the miners involved in alluvial gold panning did not care about the environment because of lack of affinity to the area they operated on. The research also found out that environmental degradation remained unchecked due to double benefits for the government in that people who would otherwise be a burden to the government got employment whilst earning foreign currency for the country at the same time. That made it difficult for government to favour environmental sustainability at the expense of socio-economic benefits during the current economic hardships facing the country. As a result AGM was being conducted in a highly unregulated manner in Ward 22 leading to environmental degradation. It is recommended that the government abolish alluvial gold panning. The government should also endeavour to fund AGM to ensure that artisanal miners do not have excuses for failure to conserve the environment. This should be supported by promoting formalisation of AGM to ensure that unmanageable mining activities are stopped. This will most likely result in a well-regulated AGM industry in which a balance is struck between maintaining and exploitation of the environment.
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CHAPTER ONE
INTRODUCTION

1.0 Background of the Study

Artisanal gold mining (AGM) in Zimbabwe has been practiced long before the coming of the colonial settlers. It has evolved from panning on the river beds to the current state where it is conducted on the river bed and over the surface or close to the surface as panning, residual mining and underground as reef or hard rock mining. However, this growing sector is complicated by unprecedented environmental damage. It is associated with loss of landscape aesthetics, damage to infrastructure, water and air pollution, land degradation, deforestation and loss of habitat (Chazovachii & Msingarimi, 2013). AGM is practiced in Zimbabwe because it is a viable business option which can be carried out with basic equipment such as picks and shovels as it requires very little input in terms of capital and technical expertise. AGM is also an important livelihood option in the face of threats and shocks that affect the people during times of joblessness, drought and seasonality. Despite the benefits AGM brings to society, it is the level of environmental damage that it brings along that is a cause for concern to society and the world at large. This brings to the fore the need to investigate the impact of AGM on the environment.

Research studies on environmental damage resulting from artisanal gold mining (AGM) abound. In many cases this problem caused by AGM perniciously undermines any further use of the affected area if no effort is put in place to reclaim the affected land. The effects of land degradation are varied and include growing water scarcity, water pollution, soil erosion, destruction of aesthetics and deforestation among a myriad of other environmental negative effects (Andrews, 2015). In a research conducted in Tarkwa-Nsuaem municipality in Ghana, findings indicated that land was degraded to an extent where it was rendered unproductive after prolonged artisanal mining in the area. Mining was taking place without any form of land reclamation. The miners and people living in Tarkwa-Nsuaem were left exposed to diseases through using water contaminated with chemicals such as cyanide used in mining processes (Baah-Enmunh & Forson, 2017). This has left the country with more questions rather than answers as to whether to consider the economic benefits of AGM at the expense of the deteriorating environment. Zimbabwe like other countries in the region such as South Africa,
Tanzania and Mozambique finds itself in a similar situation to Ghana. The question of how to treat AGM in the face of wanton environmental unsustainability.

Artisanal mining is a phenomenon as old as the ancient trade in gold done during the pre-colonial period in Zimbabwe. The practice dates back to the early States such as Great Zimbabwe State, Monomotapa State and the Rozvi State to mention but a few. These early states traded gold with the Arabs from as far back as the 13th century. This form of gold extraction which was done by blacks significantly decreased as the roots of colonisation took a firm grip on all economic activities in the country. When the colonial settlers appropriated land from indigenous people at the beginning of the 20th century, they put laws to criminalise gold mining outside licensed concessions which apparently were held by white settlers (Bowen, 1980). These discriminatory laws effectively pushed blacks out of mining activities and allowed for the establishment of formal mining companies. It was only after independence in 1980 that blacks started to engage in mining albeit to a very limited extent due to lack of capital as well as uncompetitive pricing regimes which favoured established mining firms. However, this challenge did not deter the impoverished poor from venturing into mining operations which was mainly at AGM level.

Zimbabwe started to experience the resurgence of artisanal gold mining when the country was hit by economic hardships that emerged from the Economic Structural Adjustment Programme (ESAP) which was implemented in the early 1990s (Chazovachii, 2013). This Bretton woods driven economic programme resulted in massive capital flight and subsequent retrenchments and company closures. This saw many workers losing their source of incomes and an increase poverty among the general populace. Former mine workers who lost their jobs after mine closures were some of the pioneers to the resurgence of gold panning. This category of artisanal gold miners possessed knowledge and expertise required to produce marketable gold. These were soon to be joined by the ever growing unemployed school leavers and school drop outs who could not find formal employment as the economy of the country continued to shrink.

The impacts of AGM can be understood through two separate but closely linked dimensions namely, the socio-economic and environmental perspectives (Andrews, 2015). Gold panning, colloquially referred to as Chikorokoza in Shona language, became a source of sustenance for both rural and urban residents. In the wake of the economic hardships that heightened since 2002, the influx of people into artisanal gold mining saw this sector contributing significantly
towards total gold output that found its way into Fidelity, the country’s official gold buyer. The government of Zimbabwe having realized the economic benefits of gold panning then decided to cash in by directing the panners to form organized units or even team up with small scale miners to form AGM. Estimates from the Ministry of Mines and Development suggest that artisanal gold miners were responsible for about 30% of the 11.7 tons of gold produced in Zimbabwe in 2012 (Reserve Bank of Zimbabwe, 2012). The sector has assumed a significant role as an alternative source of income for many livelihoods, weathering economic hardships across the country (Spiegel, 2015). Gold produced by artisanal miners also became a major foreign currency earner after the sharp decline of tobacco production and similar declines in production of exportable agricultural products such flowers. Such anecdotal evidence confirms that artisanal gold mining can no longer be wished away as it is rather here to stay (Singo, 2012). In his fiscal statement of the last quarter of 2017, the Governor of the Reserve Bank of Zimbabwe forecasted that Zimbabwe’s gold output would double to 23.95 tons by 2018, an indication of the importance of gold to the economy. Artisanal gold miners were expected to play a notable role in this projected increase in gold output.

The heightened resurgence of artisanal gold mining in Zimbabwe came with problems that have proved hard to contain for central government and local authorities (Spiegel, 2015). Environmental Management Agency of Zimbabwe (EMA), estimated the number of artisanal gold miners, most of whom are illegal gold panners, at half a million people across the country as of 2010 (EMA, 2013). This figure has continued to grow as more and more people are drawn into artisanal gold mining following the discovery of new gold fields dotted across the country. As poverty continues to strike, thousands of new people are forced into Chikorokoza with the hope to survive while a few succeed to make life changing fortunes through AGM and its overspills. However, in Chegutu District, Ward 22, as in many other artisanal gold mining infested areas throughout the country, irreparable environmental damage has become a serious challenge to the ecosystem, local communities and government in general. This is done with little regard for the need to protect the environment and in arbitrary contravention of statutory instruments and regulations that govern mining activities. AGM is accompanied by unsustainable environmental damages which leave more questions than answers as to the importance of this economic activity in relation to environmental damage it causes.
The Zimbabwe’s Mines and Minerals Act of 2006 is the chief legislative instrument regulating the extraction of minerals in the country. This Act requires the registration of mining concessions or gold claims. The registration of gold claims is designed for prospective artisanal gold miners to acquire a prospector’s license at a nominal fee, notification of Government agencies of the area concerned and facilitation of environmental impact assessment by EMA (Mangena, 2014). If these procedures were adhered to, the activities of artisanal gold miners could be carried out with minimum and controlled environmental degradation. Such a state was going to allow for use of the same land for other economic activities such as agricultural productivity. However, the prevailing environmental deterioration caused by AGM activities has serious ramifications for future land use and only serves to perpetuate poverty in the long run due to land wastage (Bello and Bybee, 2014).

It is a widely held view that poverty is the bane of environmental degradation in mineral rich areas in Zimbabwe including Ward 22 of Chegutu. The damage to the environment is catastrophic and a cause for concern to affected communities, local and national authorities. This calls for urgent implementation of effective policies on environmental management to promote sustainable exploitation of mineral resources in general and gold in particular. The situation prevailing in Ward 22 of Chegutu District is untenable. The extent of environmental degradation has simply reached alarming levels and has become a threat to the biosphere hence the need for research based solutions to address this problem.

1.1 Research Objectives

- To assess the forms of AGM.
- To explore the reasons why AGM is not environmentally sustainable.
- To evaluate the environmental problems caused by AGM.
- To establish if there are any local initiatives that have been put in place to make AGM environmentally sustainable.

1.2 Purpose of the study

The aim of this study was to investigate the impact of artisanal gold mining on the environment in Ward 22 of Chegutu District.
1.3 Statement of the Problem

AGM is a very important economic activity which benefits society in terms of job creation and provision of income. However, it is associated with serious environmental damage. AGM causes land degradation, destruction of infrastructure, air and water pollution, destruction of vegetation, loss of habitat and destruction of arable land (Bello & Bybee, 2014). All this has presented a lot of problems to the government, the local people and local leaders. The environmental damage has resulted in problems for the local people who have to endure pollution, find alternative sources of water for domestic use and for livestock. They also have to deal with destruction of infrastructure such as fields, roads and pathways, in fact the whole ecosystem which has to endure air and water pollution, loss of habitat and many other ills. The government has to deal with reverse development due to destruction of roads and communication infrastructure. The positive benefits in terms of livelihoods support, job creation and foreign currency earning can never be overemphasized. As such what is required is to put in place measures that ensure that AGM is conducted in a manner that ensures sustainability of the environment. Considering the importance of sustainable use of the environment and the importance of AGM to Zimbabwe’s economy, it is pertinent that the interrelations between AGM and the environment be investigated in order to help policy makers to make informed decisions on how to deal with the negative impact of AGM to the environment. This is why this research intends to investigate the impact of AGM on the environment in Ward 22 of Chegutu District.

1.4 Research Questions

- What are the different forms of AGM?
- What makes AGM to be environmentally unsustainable?
- What are the environmental problems caused by AGM?
- Which sustainable environmental initiatives have been adopted in AGM activities in Ward 22 of Chegutu District?

1.5 Assumptions of the Study

Artisanal gold mining in Ward 22 of Chegutu District is highly unregulated, resulting in dangerous mining practices that have led to significant land degradation, environmental pollution, extensive deforestation and other negative biosphere effects. This problem was
compounded by rampant use of harmful chemicals such as mercury and cyanide. If AGM could be well regulated, sustainable use of the environment could be achieved.

1.6 Significance of the Study

The world is seized with the problem of climate change as a result of industrialization and unsustainable use of natural resources. In Africa and Zimbabwe in particular, environmental degradation is a phenomena that is affecting many livelihoods, especially in farming and rural areas where dependence on land is high. This highlights the importance of human beings to ensure sustainable use of the environment. Any continuous degradation of the environment will occur at a high cost to humanity. It is a fact that problems associated with global warming and water shortage (rainfall or potable) is linked to unsustainable use of the environment or poor environmental management. It is hoped that findings of this study will help come up with lasting solutions to the subject of environmental degradation not only in Chegutu district but in the country in general. The findings will help policy makers, local authorities, artisanal miners and local communities on how artisanal gold mining could be conducted in an environmentally sustainable manner. Above all this study will contribute to the existing body of knowledge AGM and the environment.

1.6.1 Policy Makers

The findings of this study help policy makers to understand the importance of AGM as a source of livelihood for the people of Chegutu and beyond hence the need to formulate policies that are environmentally sustainable. The study illuminates the need for policy makers to come up with policies that permit people to earn their living from natural resources while addressing environmental degradation problems.

1.6.2 Artisanal Gold Miners

This study highlights the challenges of environmental degradation in Ward 22 of Chegutu District. By participating in the study, artisanal gold miners raised their awareness to the long term effects of land degradation arising from unorthodox mining methods. Through the study, participants got to realise the importance of extracting the mineral in a way that will leave the environment fit for other livelihood support. Miners came to understand the need to reclaim holes after they are done so as to keep the land fit for habitation and agricultural use for future
generations. Furthermore, these miners came to understand how chemicals they use for gold processing end up polluting their water sources, exposing them to various health challenges in the short and long term.

1.6.3 Academia

Many studies have been carried out on environmental degradation arising from AGM in gold rich areas across the globe. More research is needed in the area of climate change, a phenomenon linked to various forms of environmental degradation. The findings of this study added to the growing body of knowledge in this field, taking it that scholars need literature from which further environmental research studies could be built on.

1.7 Limitations of the Study

Limitations of a study refer to potential weaknesses which are inherent in the investigation process and are out of the researcher’s control (Simon, 2011). In this study, the weaknesses manifested as a product of mistrust during the data gathering process. Most of the artisanal gold miners had previously clashed with the police every time the law enforcement agency tried to force illegal gold miners out of their mining areas. The encounters ended up in arrests, convictions, fines and jail time for some unfortunate gold panners. Such experiences made artisanal gold miners in Ward 22 of Chegutu District suspicious of strangers, especially those who ask questions regarding their operations. Participants who were selected from artisanal gold miners were at first very apprehensive of the researcher’s intentions. This challenge was mitigated through building trust with the miners through participating in their daily activities during the data collection period. The study also used revered local leaders to facilitate communication between the researcher and respondents.

1.8 Delimitations of the Study

Delimitations of a research study refer to those characteristics that limit the scope of investigation as well as the geographical or time boundaries of a specific study (Simon, 2011). Unlike limitations of a study, delimitations are within the control of the researcher who makes the above choices. This study used qualitative research methods to understand the impact of AGM on the environment. Ward 22 of Chegutu District was used as a case study to explore the
impact of AGM on the environment, focusing on impact of AGM on the environment. The study was conducted for a period of ten months, from December 2017 to September 2018.

1.9. Definition of Terms

1.9.1 Artisanal gold mining

There is no one agreed definition of AGM. However, AGM includes formal and informal mining operations which employs rudimentary and simplified mineral exploration, extraction and processing methods. It is a low capital intensive venture but relies on high intensive labour (Masuku, 2017). AGM could be conducted as an individual, family, group, cooperative or partnership business venture.

1.9.2 Environmental Degradation

Environmental degradation refers to the deterioration of the ecosystem as a result of complex inter-relationships between socio-economic use of natural resources and sustainable reclamation. According to Andrews (2015), (Bridge, 2004) environmental degradation constitutes many undesirable changes or disturbances to the environment. It implies all forms of deterioration of the environment through depletion of resources such as water, soil, mineral resources and all kinds of destruction of the ecosystem. In this study, environmental degradation was used to refer to any changes or disturbances to the environment perceived to be deleterious or undesirable as a result of artisanal gold mining activities.

1.9.3 Environmental security

Environmental security comprises the various dynamics and interconnections among the natural resource base, the social fabric of the resource endowed community and the economic activities of the local community relative to sustainable livelihoods (Galatowitsch, 2012).

1.9.4 Impact

Impact implies the effect of an object on the subject. In this study this means how AGM affects the environment. It means the dynamics that interplay between AGM and the environment thereby resulting in adverse effects on the environment such as land degradation, deforestation and siltation etc.
1.9.5 Sustainable development

According to McNamara & Morse (2013), sustainable development refers to development that is designed to meet the long term needs and aspirations of the present generation without compromising the ability of future generations’ access to the same resources according to their own needs. That implies the use of natural resources in a way that enables the same resource to benefit future generations.

1.10 Chapter summary

This chapter presents an introduction of the dissertation. The dissertation was made up of five chapters with chapter one covering the introduction. Chapter two details the literature review in which various literature informing the research was discussed. Chapter three covers the research methodology. It presents the research design, population sample and sampling procedures employed. The research instruments, data collection and analysis procedures were also detailed including ethical considerations that were employed in conducting the research. Chapter four basically covers the findings of the research which came from the discussions, observations and the final analysis. Chapter five provides the summary of the study. It covers the conclusions and the recommendations.
CHAPTER TWO
LITERATURE REVIEW

2.0 Introduction

This chapter will review the literature on the impact of AGM on the environment. Literature review is an important research tool. It performs a number of functions namely: contextualizing or bringing the study into focus; helping identify what has been done before hence identify gaps in previous studies; justifies if the research has not been done before; and educates the researcher on previous researches. The conceptual frameworks guiding the research highlight the beginning of the literature review. The chapter then discusses the forms of mining that form AGM and these were hard rock mining and alluvial gold panning. Due to the fact that AGM contributed to the depreciation of the environment, the reasons that make AGM to be environmentally sustainable will also covered. In order to contextualize the research, problems caused by AGM will be pointed out and discussed. To indicate what is lacking, local initiatives to mitigate environmental degradation will also be discussed.

2.1 Conceptual framework

The Sustainable Livelihoods conceptual framework (SLF) is widely used approach in the field of human developmental practice. This approach is a favorite concept in dealing with the wellbeing of people and the environmental issues that affect them. The main assumption of SLF is that a livelihood can be sustainable, if it is resilient in the face of external shocks and stresses such as hunger and poverty without negatively affecting the natural resource base (McNamara & Morse, 2013).

The robustness of the SLF is captured in many definitions from various scholars in the human development studies. Mangena (2014) writes that sustainable livelihood comprises the capabilities, assets and activities required for a means of living. This conceptual view implies that a livelihood is considered sustainable when it can cope with the stresses exerted on it and still maintain or recover in time to enhance its capabilities to provide for the now and future needs of the affected population. It also implies the use of natural resources without undermining its base (Reed & Stringer, 2016). In the case of mineral endowed areas, sustainable livelihoods conceptual frame would imply the extraction of such minerals to sustain peoples’ lives but in a
way that is conscious of future needs for the same. In this regard, the biggest aim of SLF is the elimination of poverty among people living in mineral rich localities.

The SLF is built on six salient features namely, people centeredness, holistic, dynamism, sustainability, links and focus on strengths areas. The primary focus of the SLF is the lives of people rather than the use of natural resources for posterity. The SLF is sensitive to the everyday needs of the people that require fulfilment. It is the local resources therefore which are used to provide these human needs (McNamara & Morse, 2013). At the same time, the SLF is conscious of the fact that natural resources are finite and cannot be simply replaced or recovered hence the need to use them in a way which caters for the present and future needs (Naresh, 2009). In other words, SLF provides a holistic view on the various facets of the lives of people and the constraints which they encounter in trying to provide for their needs. This perspective considers both the people and how they utilize resources given to them by nature (Mangena, 2014). Instead of focusing on the exclusive preservation of the natural environment, SLF provided a wider lenses form which the relationship between the need for livelihood support in the short and long run and environmental sustenance could be viewed. The SLF provided this study with an opportunity to step back and examine the wider linkage between AGM activities and the environment in which such activities take place.

The SLF is dynamic in its approach to understanding human behavior as they seek to make a living out of their environs. The ever changing demands of life, the projections of environmental changes which are likely to emerge from environmental use, was better appreciated through the lenses of SLF. The concept emphasizes the human potentials and strengths which are inherent within the communities they live. This is a positive view the environment as the basis through which people can achieve their life objectives (Mangena, 2014). This is contrary to pure environmental frameworks which divorce people from their environment, viewing it as a separate entity that must be left alone. In other words, SLF blends the need for promoting people’s livelihoods and the equally critical need for sustainability of the environment (UNCCD, 2016). The framework therefore, helped the study to link between existing mining policies or lack of them, and the needs of the affected people.

The SLF framework proved to be a useful tool for structuring a review of secondary information sources and offered a way of organizing the various factors and making relationships between
them. The framework specifically highlighted the links (or lack of them) between the macro and the micro level and highlights that higher level policy development and planning is being formed with little knowledge of peoples’ needs and priorities. The principle guideline provided by the SLF was that the environment is an asset offering options to its inhabitants. Those assets are for their sustenance and must be used in ways which mitigate negative environmental impacts (McNamara & Morse, 2013).

2.2 The forms of artisanal gold mining

Gold mining can be traced to ancient times, mainly to the gold rush era from 1848 to 1855. The value of gold and its extraction methods have not radically transmogrified for the small scale miners (Jenkins, 2014). Most of the early forms of gold mining are still in use to this age, especially among small-scale miners. Gold mining sophistication has however, taken place and is employed by large and established mining companies. Mining conglomerates are the ones with the financial muscle to afford the huge investments required in capital intensive mining operations.

There are various forms of mining across the world’s gold rich areas. These include hard rock (reef), dredging, rocker box, sluicing, panning, placer and residual gold mining. While these forms of gold extraction are used in different places, only two of them namely panning and hard rock, are discussed here because they are the main ones used in Chegutu District.

Gold panning is widely used by predominantly poor resourced people to extract gold which is deposited in riverbeds, riverbanks, stream banks and other open deposit areas (Spiegel, 2015). It is a manual technique of separating gold from other materials. Sand which contains gold deposits is taken from river beds or from the edges of the stream, where the density of gold allows it to concentrate. In the early gold rush era, wide shallow pans were used to separate alluvial gold from sand. In Zimbabwe, household dishes, wooden pan dishes, buckets and plates are used in place of the pans (Chazovachii, 2013). These domestic wares are filled with the gold ore. The dish is then submerged in water and shaken, sorting the gold from the gravel and other material. As gold is much denser than sand or rock, it settles to the bottom of the dish, allowing the miner to discard the sand and remain with the gold. This type of mining is heavily dependent on water which in turn pollutes nearby rivers and streams.
Like in the old gold rush period, gold deposits are found free in nature, in riverbeds, stream banks, river crevices and deep depressions. This is the gold that attracts the small scale and artisanal miners, who can access the precious mineral through using basic and rudimentary mining methods and extraction tools. Panning is a common form of gold mining. It is the cheapest, easiest and quickest form of gold extraction (Bello and Bybee, 2014). Although panning is not commercially viable, it is the most practices gold extraction technique used by small scale miners. It does not require any capital to commence operations because it relies on labour rather than anything else. To process the extracted gold and with the intention to get every milligram of gold from the sand, miners use chemicals such as mercury and cyanide (Hilson & McQuilken, 2014).

Gold panners, like the ancient miners during the early Gold Rush years have their hearts and minds fixed on only one thing, gold. Little or no care is given to the impact of their activities to the environment (Ontoyin & Agyemang, 2014). Neither is any thought given to sustainability of such resources for future generations.

Hard rock gold mining is another form used to extract gold. This method is used by small scale to large scale mining concerns. The method is used for cases where the gold deposits are encased in rocks rather than fragments in loose sand. Gold deposits targeted by this form of extraction can be found from an average of 20meters underground (Andrews, 2015). Such depths require extra safety measures such as interior support to prevent mine collapse and air conditioning to control the unbearable heat for the workers. This method can produce large quantities of gold hence it is commercially viable (Bello and Bybee, 2014). The costs of setting up the mine, are usually beyond most artisanal miners hence it’s regarded as a preserve for large mining companies. However, in Zimbabwe and Chegutu in particular, gold deposits are found relatively at shallow levels underground. Artisanal gold miners can still use picks, shovels, hoes and drills to dig deep for this treasure. To avoid going deeper, the miners dig multiple tunnels to follow the belt of gold deposit (Arango, 2013) . Such tunnels are dug without any form of environmental assessment considerations. This leaves the area resembling a mess of holes and heaps of soil. The concentration of people working as individuals, families or cooperatives within the same area without some kind of organized control, means that the dug holes end up in each other’s
way. This poses more risks of mine collapse, deforestation and pollution and many other forms of environmental degradation (Arango, 2013).

2.3 The reasons why AGM is not environmentally sustainable

Whenever a project which is likely to affect the environment is to be carried out in an area, there must be an environmental impact assessment (EIA), (EMA, 2002) and (Mangena, 2014). The role of the EIA is to deal with the likely effects of the activity or project on the various environmental elements which contribute to life. This is cognisant of the fact that the environment implies the conditions and influences that provide habitat to flora and fauna hence it must be protected. The main aim of EIA is to ensure early integration of environmental issues in making decisions so that likely adverse effects can be identified and addressed (Mangena, 2014). This will ensure that the planning process includes mitigatory measures so that any negative impacts are not allowed to occur during the project life. The two studies above and the EMA, 2002 acknowledge the importance of taking care of the environment. The studies also point out an important aspect. The issue that EMA was failing to enforce regulation.

2.3.1 Importance of EIA

The importance of EIA can never be overemphasized. It enables the documentation of the negative or positive impacts a project is likely to have on the environment; it forces the project owners to be accountable; it helps identify impacts that arise from the project in the immediate, future and long term period; it can also indicate impacts that are beyond redemption (Ganesh., Machaka & Mapfumo, 2016). When Zimbabwe mooted the idea of EIA in 1994, Chinamora (1995) posited the positiveness of the idea. However he warned against basing the EIA on foreign guidelines which would likely miss the peculiar situation obtaining in Zimbabwe. Considering this 1995 observation and what was happening in the EIA scenario today one would tend to believe that Chinamora aptly foretold what would happen in the regulation of AGM in the future. The issue of costs, bureaucracy lack of transparency etc. According to Gutu (2017,p3), many AGM operate informally due to the high costs involved in administrative processes. The costs of compliance were too high for instance the cost for EIA for a claim was $200.00 among other costs. This resultantly forced AGM to employ smash and grab tactics thereby avoiding legitimate processes to establish their business. A result of this was the destruction of the 155.85km of plant and animal life along the Mazoe river (Gutu,2017). The two
studies above are only a sample of the myriad of others that point out that the lack of sustainable exploitation of the environment in Zimbabwe is due to a number of reasons for example high costs and bureaucratic processes in the run up to authorisation of AGM.

Unlike what has been said by the earlier studies, as one takes the issue of EIA further, Ganesh, Machaka & Mapfumo (2016) point out that the EIAs included just 65% of the crucial information for decision making. Some of the crucial data required was found to be lacking in the EIA. This study further alludes to the fact that the process suffered from lack of political will and that proponents (project owners) sometimes just conducted EIA to get a certificate. This study points out the importance of awareness raising and incentives - a dimension not commonly hinted out by earlier studies.

Whilst the issue of lack of supervision (abrogation) on the part of EMA was cross-cutting, according to (Bere & Machaka, 2014), other issues contributed to AGM failing to exploit the environment sustainably. The issue of high costs (1.5%) of project to be paid for EIA, the time it took for approval of project (80) days and the fact that the onus was on the project owner to conduct the EIA made the pursuit of EIA a futile exercise. This was made worse by the fact that some EIA reports were of poor quality; some were difficult to comprehend; and that some EIA findings were compromised to benefit those conducting them (Bere & Machaka, 2014). This observation failed to identify another cause for poor regulation. The issue of the hidden hand. According to Mawowa (2013) influential people who were involved in AGM protected their miners from the law thereby allowing free reign wherever gold deposits could be found. This made it difficult for the regulatory authorities to enforce compliance with laid down rules/regulations. The 1.5% per project as of 2014 has been reviewed to $200.00 per claim, however that still remains high (Gutu, 2017).

2.4 Environmental problems caused by AGM

AGM is not just a source of livelihood for millions of people across the world but it is a substantial contributor to national revenue for many countries, especially in the African continent. However, anecdotal evidence indicate that AGM is associated with various forms of environmental degradation including deforestation, wastage of agricultural land, pollution of rivers and other water sources, siltation, soil erosion and galley creation and many other ecosystem disturbances (Thornton, 2014). This study takes it that environmental degradation
caused by AGM activities affects different areas in different ways, forms or extent. For example, environmental problems in areas where gold is found on river beds and stream banks are different from problems found in areas with gold found underground. However, these different forms of environmental degradation share common features regardless of the specific context in which they happen. These commonalities are reviewed below.

2.4.1 Land Degradation

Land degradation refers to threats resulting in the compromise of the quality of land resources which are necessary to support the ecosystem. This form of degradation is conceived in relation to the loss of functions and services which enhance stable food security, climatic challenge and other biodiversity challenges (Reed and Stringer, 2016). The importance of maintaining a functioning land surface must never be overlooked. At global level, the will to tackle land degradation has gathered momentum due to the recognition of negative impacts this problem can cause. This global willingness is amply captured in UN’s Sustainable Development Goals (SDGs), target 15.3, which states that ‘By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation neutral world. The importance for the prevention of land degradation was also high on the agenda of the United Nations Convention to Combat Desertification (UNCCD) which was held in Bonn, Germany in 2016 (UNCCD, 2016). This global convention called for the restoration and sustainable land management practices at on-site or off-site.

In gold rich areas, land degradation is evident on-site and the effects are also felt in areas beyond the location the initial degradation occurs. The most common features of land degradation in AGM areas are various sizes of soil heaps and holes across the field. The holes, which are the gold mines, could be still operational or abandoned. In the latter, the holes are left unfilled and the soil is not spread to even the ground. This soil is eventually carried by surface water and deposited into rivers and dams during rain seasons, causing siltation, contamination and future water shortages among a myriad of other adverse effects on the environment.

Another common feature in AGM areas is the wanton deforestation. The congested but uncoordinated clearing of trees preceding the digging of mine holes leaves the areas devoid of vegetation. The trees are cut and used as mine support pillars at certain levels of depth. They are the sole sources of energy, used for cooking, heating and sometimes for burning the gold during
the processing stages. Temporary and permanent structures are also constructed using wood. In fact, in AGM areas, it is common to find people who specialize in the business of supplying all kinds of required wood. The compounded effect of this is desertification and unsustainable land management (Barkemeyer, Stringer, Hollins and Josephi, 2015). Coupled with other human activities, AGM areas sooner or later become devoid of vegetation. The disappearance of vegetation is linked to the decimation of the whole ecosystem, leaving the areas not only environmentally unsustainable but also limited in their capacity to sustain human livelihoods (Jordaan, 2013).

According to the concept of the Economics of Land Degradation (ELD) initiative report ELD (2015) the destruction of vegetation, soils and water is a potential prelude to long term environmental catastrophe. These environmental antics undermine the land’s capacity to maintain healthy ecosystems and therefore, bear a huge cost to possible short and long term land use (Orr, Cowie, Castillo Sanchez, Chasek, Crossman, Erlewein, Louwagie, Maron, Matternicht, Tengeberg, Walter and Welton, 2017). The UNCCD and the ELD are looking at a raft of measures to arrest any land degradation because of the problems which are posed by this form of environmental degradation, which is rampant in many AGM areas. The bodies acknowledge the role played by environments in sustaining local livelihoods.

Mining and AGM in particular are fingered as main drivers of land degradation hence the call for the restoration of degraded land back to sustainable conditions. This could be achieved through a combination of land management practices. In this regard, restoration implies returning the degraded areas from their current state to a functional present and future state. In most cases, rivers in gold rich areas are victims of AGM activities, attracting hordes of miners from local and faraway places (Basure & Chazovachii, 2013). In these rivers alluvial gold mining takes place along riverbeds and riverbanks. Extraction of gold from such areas results in negative alteration of the river morphology without any form of recourse. Resultantly the ecosystem that is supported by the river loses habitat as rivers collapse due to heavy siltation and oftentimes aquatic life surely becomes extinct (Keane et al 2015).

Agriculture is the backbone of most rural communities but the recurring of droughts especially in Sub-Saharan Africa, forces the rural populace to engage in AGM as a way for sustenance. While local people would try to safeguard their fields from the mercy of gold seekers, the fields are not
entirely spared because the locals are prepared to sacrifice their fields for the immediate relief that gold pickings can bring in terms of the much needed income in the absence of agricultural production (Ontoyin & Agyemang, 2014). Coupled with hunger resulting from droughts, the widespread unemployment, seasonality, is a huge driving force towards the growth of AGM and the human concentration in gold rich localities (Jordaan, 2013). Such a phenomena results in certain areas being overwhelmed by the sheer numbers of people. This translates in the deterioration of the land owing to the pressure exerted by people digging for gold, transforming the land into fields of holes and galleys, with little hope for any other productive use.

2.4.2 Water Pollution

Artisanal gold mining is increasing in many local communities across developing countries. The increasing AGM operations are driven by globalization, a development which has practically transformed communities into a world of materialism. In the 21st century, human sustenance have practically become dependent on the ability to obtain some cash income. In this regard, millions of poor people get the much needed income from the proceeds of gold, a product with a ready market at all levels of society. It is a fact therefore that AGM is a source of livelihoods for many people hence many governments’ reluctance to outlaw it regardless of its effects on water contamination.

Water is a critical element in AGM operations. It is used in the processing stage, to separate the gold particles from the sand or rocks. The sources of this water are rivers, dams and underground water that is accessed through boreholes or after the mine hits the water table. The use of chemicals such as mercury and cyanide in the processing of gold is common in AGM. These chemicals oftentimes end up in the water sources, polluting them in the process. A study carried out in Birim, North District in Ghana by Ontoyin, J. (2014) found that the water in rivers, boreholes and streams were polluted by chemicals. The mercury concentration levels in water sources around the area exceeded the drinking water safe limits as per World Health Organisation (WHO) standards. Similarly, another study conducted in Tarkwa, an area under the jurisdiction of Nsuaem Municipality in Ghana agreed with the Birim North District. The study concluded that spillages of chemicals used in AGM in this area exceeded WHO’S permissible limits. The study further indicated that these chemicals were found in the soil and ultimately in
the food crops grown in the area. The levels of water pollution in these two areas were assessed as posing human health risks.

This study assumed that the same mercury emissions threatening studied AGM communities in Ghana, also exists in Chegutu District, in Zimbabwe, where miners are using the same chemicals for their activities. The misuse of mercury and cyanide in Ward 22 of Chegutu District, derives from both pure disregard for safe environmental practices and lack of knowledge. Insufficient knowledge about cyanide and mercury toxicity and the role they play in polluting waters sources in the immediate site and downstream water bodies, is also attributed to the problem. This explains the large quantities of toxic chemicals in most AGM areas including Ward 22 of Chegutu District. The collective toxic chemicals used in AGM is estimated at more than 1350 tons, which is released into the global environment annually. AGM operations in Ghana are estimated to contribute 5 tons of mercury towards the estimated total global figure (Vincent, Nartey, Raphael, Klake, Ebenezer, Hayford, Louis, Doamekpor, and Richard, 2011). This is a clear indication of the extent of water pollution as a result of poor AGM mining practices. With the increasing AGM activities in Chegutu, water contamination in mining on-site and off-site is expected to reach alarming levels.

The case studies cited above are just a few among many other studies on the impact of AGM on the environment, with particular reference to water pollution from toxic chemicals. These research studies have provided significant findings highlighting the negative impacts of AGM on the environment. Thornton (2014) even goes a step further to identify the similarities of the AGM in South Africa and Zimbabwe albeit with the same challenges. It is disheartening to note the lack of effective initiatives aimed at mitigating pollution problems. The only notable framework is the Convention on the use of Mercury. This Convention was signed by 92 countries regulating the use of mercury in AGM activities. Keane et al (2015) details how global efforts to control the use of mercury have helped reduce the danger of mercury use in AGM pursuant to the Minamata Convention on mercury pollution. However the success of this initiative has not been pronounced considering that this initiative depends on governments being assisted through donor funding to conduct the program. The initiative is dependent on donor funding, which may apply to some countries and not others. Specific solutions to environmental
degradation, especially on water pollution by toxic chemicals, remain limited hence requires new initiatives to confront this environmental problem head-on.

2.5 Initiatives to mitigate environmental degradation caused by AGM.

Artisanal gold mining transcends the direct financial benefits that it brings to peoples’ livelihoods. If left uncontrolled, it can cause untold environmental degradation ranging from land to water pollution. While well-established gold mining companies are obliged to observe strict environmental policies as a way to reduce all forms of environmental degradation, AGM operations oftentimes ignore such legal frameworks. In the end, causing destruction of the environment through water contamination, destruction of agricultural land and endangering the whole ecosystem. This calls for AGM to adhere to responsible mining practices which strive to minimize environmental problems. Such initiatives are looked at below.

2.5.1 Case of Latin America.

Latin America is endowed with gold resources most of which are mined through AGM. Countries in this region including Colombia, Bolivia, Venezuela, Peru and Ecuador are seized with Illegal mining activities. Gold mining in this region have proved to be viable means out of poverty in most rural Latin America, to the extent that AGM has been described as the “new cocaine” of the region. However, the environmental consequences arising from these mining activities have led countries to reconsider the effectiveness of their mining laws. The objective of the laws were to curb illegal mining activities as a way to protect the natural environment. In Ecuador, the overall objectives of mining framework was the enhancement of artisanal small-scale mining. The framework was aimed at formalizing AGM as a means of livelihood as well as to promoting sustainable mining methods that enhance the environment.

In 2009, Ecuador, established a legal framework that speaks to the need for recognition of AGM as a means of livelihood as well as the need for conducting it in an environmentally friendly manner. The new mining framework a highlighted the need for promotion, technical assistance, training and financing of AGM for the sustainable development. It also incentivized environmental protection efforts through the creation of efficient production methods. The new legislation was a positive move from the previously failed attempts to stop environmental degradation by way of banning AGM. Prior to the new framework, Ecuador had used various
means including military interventions, confiscation of gold and destruction of mining equipment, as deterrence measures. The use of such initiatives was met with resistance and it hardened the miners to the extent that they started fighting back.

A shift from viewing AGM as an illegal business activity to a formalized and inclusive framework involving the participation of government institutions and the affected people, went a long way in promoting environmental awareness among miners. However, the formalized AGM framework in Ecuador, was met with its fair share of challenges. In attempts to avoid taxation, most miners avoided the formalization processes hence they never observed environmental regulations. Lack of consequences from authorities fueled most of the illegality of AGM and resulted in serious environmental degradation (U.S. Department of State and Biodiversity Research Institute, 2011). Furthermore, the formalized AGM framework never sort to coordinate AGM and large mining companies hence the two continued to operate differently, with the former perpetuating environmental degradation while the later protected the same. This gap highlighted the need for more comprehensive initiatives that are inclusive if environmental degradation is to be tackled.

2.5.2 Case of Tanzania

Tanzania opened its mining activities in the 1980s. The liberalization of this economic sector saw a dramatic increase in the number of people venturing into AGM. By 2000, the number of Tanzanians engaged in AGM and Small-Scale mining was estimated at over a 1,000,000 people (Kitula, 2006). The liberalization of the mining sector significantly boosted the recorded growth in the Tanzanian economy. At the household level, the sector immensely contributed towards poverty alleviation. However, the environment degradation in the gold rich areas became appalling. The government of Tanzania responded with a raft of measures to salvage the situation. Several laws were enacted including the Environmental Management Act of 2004, the Mining Policy of 2009 and the New Mining Bill of 2010 among many other legislations (Ontoyin & Agyemang, 2014). These initiatives were adopted as a way to mitigate environmental problems caused by AGM.

The overall objectives of the various mining policy frameworks was to support AGM through transforming it into organized and modernized small-scale mining entities. However, the raft of policy frameworks to enhance environmentally friendly mining practices in Tanzania suffered
implementation challenges and compromised framework effectiveness (Singo, 2012). The large numbers of people involved and the spread of areas where AGM is conducted, makes enforcement of regulations very difficult for Tanzanian authorities. A mere rumor of newly discovered gold areas in no time brings large numbers of AGM operators resulting in uncoordinated cutting down of trees as diggings become major activities (Andrews, 2015).

Through the various legal frameworks, strategies to raise environmental awareness through the media has had only a limited impact because AGM is mostly carried out in remote areas where the media is inaccessible. A case of the urban bias theory. Regulations that require the use of environmentally sound technologies and mining methods have also failed to bear the required effect because most people in AGM lack the financial muscle required to procure modern mining equipment. Finally but least, these regulatory frameworks lack a sound basis from the beginning because most AGM operations precedes any environmental impact assessment (Arango, 2013). These policy failure calls for comprehensive and inclusive frameworks which involve the participation of local people in the preservation of their communities. Such approaches require investments in mining research focusing on environmentally friendly green mining methods.

2.5.3 Case of Zimbabwe

As a way to address various environmental degradation challenges including water pollution, Zimbabwe Government legislated AGM activities. Miners are required by mining regulations to carry out land restoration activities, mainly through backfilling of dug outs and excavated pits left by AGM (Basure & Chazovachii, 2013). This requirement is a control measure for environmental restoration during and after AGM. While the legislation is there, the challenges are in implementation and monitoring. Most mining frameworks put in place to preserve the environment remain more of encouragement than regulation. As evidenced in many AGM areas throughout Zimbabwe, the policies are largely ignored, especially in Ward 22 of Chegutu District. Matar and Anthony (2017), commented that issues of enforcement were problematic hence this study revisited the measures that have been put in place to control environmental degradation caused by AGM in Ward 22 of Chegutu District. The requirement for research studies to provide direct solutions remains critical. This was the spirit in which this study was carried out. A review of literature was done to understand the initiatives that were used in other
AGM areas, with the aim to arrest or reduce environmental degradation without necessarily stopping mining activities.

2.6 Chapter summary

This chapter detailed the review of the literature. It outlined the conceptual framework used in the study namely the SLF. The concept helped to illuminate the importance of responsible use of natural resources to sustaining both current and future generations. Two forms of AGM were discussed in this chapter namely hard rock and alluvial gold panning. The alluvial gold panning is used in cases where the gold ore is deposited on the surface of river streams; river banks and river beds whilst hard rock mining is used for underground mining. The importance of EIA to AGM was also discussed in this chapter and so were problems affecting AGM. Finally various initiatives to make AGM more sustainable were presented with a discussion of three case studies. Chapter 3 will detail the research methodology and design.
CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

Chapter three will cover the research methodology. The chapter will begin with a summary of the research methodology and the research design. Then data collection methods and research instruments will be discussed. This will be followed by a description of the target population, the sample and sampling techniques. Ethical issues involved plus validity and reliability will also be evaluated. The data presentation and analysis procedures will lead to the summary of the chapter.

3.1 Research Methodology

Research methodology refers to philosophical lens through which the researcher views and makes decisions about a research study (Dodgson, 2017). There are three basic research approaches used in conducting a research. These are qualitative, quantitative and mixed methods research approaches. Some scholars refer to these methods as research paradigms. Creswell & Poth (2017) describes research approaches as guidelines to conducting a research study. Other scholars view research methodology as an approach or strategy used to guide an inquiry (Denzin & Lincoln, 2011).

This study was guided by the qualitative research methodology. Unlike the quantitative research methodology, qualitative researchers acknowledge the presence of multiple objective reality in any given situation. Qualitative methodology is based on the belief that there are multiple ways in which to understand a phenomenon (Dodgson, 2017). The world is viewed as subjective, with multiple realities based on perceptions and experience of the researcher as well as the people who are affected by a specific phenomenon. The subjectivity of these multiple realities are products of socioeconomic and cultural context in which a research study is taking place (Maxwell, 2013).

Qualitative research methodology is underlined by the researchers’ wish to explore and make sense out of social phenomena. In this study, the use of qualitative methods such as in-depth interviews and field observations was appropriate in generating data, accompanied by exact words and emotions from the participants (Dodgson, 2017). The qualitative methodology was
also found to be appropriate for capturing data from respondents drawn from the target population. The impact of AGM in Ward 22 of Chegutu District could not have been better understood without interacting with the people and the environment in the natural setting. The lived experiences remains the most suitable way through which credible data on human activities can be collected (Creswell & Poth, 2017). In this respect, the use of qualitative research methodology was found to be effective in answering critical questions in this study. Questions such as ‘what forms of AGM are taking place in Chegutu’ and how they are causing environmental degradation, are best answered and understood from the point of view of those people affected within that environment.

Finally, use of the qualitative methodology brought the researcher at the center of the context, which is Ward 22 of Chegutu. As the primary data gathering instrument, the researcher came face to face with the realities of AGM and its impact on the environment (Dodgson, 2017). Such an in situ experience presented the researcher with an opportunity to witness the negative side of AGM on the environment.

3.2 Research Design

The study used a case study research design. This is a qualitative study approach in which the researcher explores a specific phenomenon for a period of time using in-depth interviews in situ, observations and documentary evidence among other data collection methods (Yin, 2014). A case study is a form of qualitative research design (Creswell, 2015). The utility of the case study research design has stood the test of time. The use of this design is traced back to the early twentieth century when it was applied in the conduct of lengthy ethnographic studies mostly of ethnic cultural groups or individuals. Case studies were popularly used in the field of anthropology but they have since spread to other social sciences (Merriam, 2009). The essence of using a case study research design is found on its emphasis on the collection of qualitative data that will be used to understand the studied phenomena. In this research, the patterns of life in Ward 22 of Chegutu District, including its environment were established.

Considering the complexity of the link between the need to preserve the environment for sustainable livelihoods against the pressing and current need to make a living by people of Ward 22 of Chegutu District, a case study research design provided on which the delicate situation was explored. The use of a case study provided the fluidity required in studying complex matters
affecting people and how they seek to address their problems using local resources (Yin, 2014). In this regard, the case study design enabled the researcher the flexibility to tailor make the process of unpacking AGM on the prevailing environmental problems in Ward 22.

Given the qualitative nature of case study designs, it is important to note that this study adopted this design for its broad and encompassing methods (O'Leary, 2014). This includes exploratory, explanatory, interpretive and descriptive methods, which enabled the researcher to get in-depth knowledge on the impact of AGM in Ward 22. Using this research design proved useful in getting to the depth of the matter, which is impact of AGM on the lives of people in Ward 22 and the resultant environmental degradation arising from the mining activities. Guided by the case study research design, the researcher was the main data gathering instrument hence the opportunity to experience the phenomena first hand. This advantage helped the researcher to acknowledge the presence of multiple realities on AGM activities in the area under study (Creswell & Poth, 2017). By focusing on the case study of Ward 22 of Chegutu District, the researcher was able to view issues in the context in which they were happening, that is to say from the point of view of the participants rather than hearsay or by imposition of views and findings from other studies.

Guided by the case study tenets, this study collected data systematically using interactive methods which are the backbone of case studies. In doing so, the study generated reference data which is peculiar to Ward 22 of Chegutu District. The lived experiences including participant’s daily practices, motivations, aspirations and concerns were visited. This was done in relation to the connectedness of such activities to the local environment (Polit & Beck, 2017). The single focus on the area of study clearly illuminated AGM mining methods’ impact on the immediate and far reaching environment. In this regard, the case study design threw the researcher in the middle of the context (Casey & Houghton, 2010).

Case studies employ a broad scope of methods and interpretive practices such as observation, interviews and desk research, within the same study (Mills, J. 2014). This provided the researcher with an opportunity to engage with the hearts and minds of artisanal miners in Ward 22 of Chegutu District, while getting the visual experience of the affected environment (Dodgson, 2017). In so doing, the case study design presented two distinct advantages namely capturing participants’ point of view and examining the constraints of the participants’ everyday
life experiences. These were used to secure credible data that was used for rich descriptions of the impact of AGM on Ward 22 of Chegutu District. These attributes are exemplified in case study researches. The fundamental goal of case studies is to conduct an in-depth analysis of a specific matter, within its context with a view to understand the issue from the perspective of participants (Yin, 2014). It was from this understanding that the researcher, in a bid to explore, understand and present the participants' perspectives on AGM and its impact on the environment, got to obtain data in actual natural setting (Creswell, 2015). The interaction with participants generated rich data, an indication of the high level of connection between researcher and participants within Ward 22 of Chegutu District.

Like any other research design, case study designs are not without their weaknesses. This design is mired in subjectivity problems. In a case study, researcher's perceptions and interpretations become part of the research and as a result, their subjective and interpretive orientation flows throughout the inquiry can result (Mills, J. 2014). This study acknowledged this pitfall and employed measures to reduce such problems. The study used a reflexive approach which included note taking, recording participants verbatim and capturing of images. This helped to support descriptions of the state of the environment and other activities prevailing in the area of study (Denzin & Lincoln, 2011). These measures helped to reduce researcher bias due to the rigor that was maintained throughout the research.

3.3 Data Collection Methods and Research Instruments

The goal of a research study is to produce findings that could be used to add value to human kind. It is in this context that researchers use science as a way to apprehend the multiple realities in the social sciences (Maxwell, 2013). More importantly, positivist researchers acknowledge that no one from of measurement or methods is perfect. Therefore, this study opted to use a number of data gathering methods in order to circumvent weaknesses and errors inherent in different methods. The study used in-depth interviews, observations and desk research to collect data. This was done to enhance the researcher’s understanding of the reality of AGM in Chegutu District as well as its impact on the environment in Ward 22 of the same district. Triangulation of data collection methods is a significant measure in ensuring the quality of a study (Creswell, 2015). The use of the three data collection methods was found to be complementary informative.
in this case study, as a result comprehensive and synergistic view of the environmental issues characterizing AGM in Ward 22 in Chegutu District was produced.

The study viewed data collection as an essential component in the success of this research. It further acknowledged that data collection as not an easy task hence the triangulation of these interactive methods of data collection. The data collection methods and their instruments are discussed below.

3.3.1 Interviews

Interviews are widely used in research to gather data from respondents. An interview is a systematic conversation carried out for the sole objective of collecting data from individuals or groups through a one on one discussion (O'Leary, 2014). This method was used to gather data from participants who were drawn from Chegutu District, who included artisanal miners, community leaders and environmental professionals working in this district. The advantage of using interviews was that participants are directly involved in the research process. Their active participation empowered the researcher by getting first-hand information on the interaction between the respondents and the environment. A priori-prepared interview guide was used during the interviews, however it was used flexibly depending on the replies from the respondents. The instruments gave the researcher more control over the interviews.

3.3.2 Observations

Observation refers to a systematic description of events, behaviors, and activities in the social setting chosen for study (Dodgson, 2017). It implies the process used by researchers to learn about the activities of the people under study in their natural setting through watching them and sometimes participating in their activities. Observation immerses the researcher into the situation, enabling him or her to engage all the senses thereby getting a better understanding of issues under observation. Observation is characterized by such actions as having an open, nonjudgmental attitude, being interested in learning more about others and getting to appreciate why they are behaving in a particular way. This understanding must be derived from the shoes of the people involved (Chiromo, 2011). Gathering data through observation allowed this study a holistic understanding of AGM operations and their resultant impact on the environment in Ward
22 of Chegutu District. The study used cameras to capture pictorial data on the degraded environment. The researcher was instrumental in recording of the observed data.

Observation was used to compliment in-depth interviews and desk research to collect data for this study. This method was instrumental in providing firsthand data, a characteristic that lacks in the other methods used in other studies of this nature. Observation does not depend on external sources of information or the voluntary willingness of respondents such as some of the miners who were in the habit of terminating interviews in order to attend to their mining activities. Through observation, the researcher was able to collect more credible, reliable and valid data for this study. The research instruments used in conjunction with this method were under the full control of the researcher hence there was timeous collection of data.

3.4 Target Population

Target population refers to the total elements, animals or people from which data is to be collected for purposes of further analysis (O'Leary, 2014). The target population for this study included people from Ward 22 of Chegutu District, artisanal gold miners operating in Ward 22 and environmental professionals working in Chegutu District.

3.5 Sample and Sampling Technique

Sampling technique is systematic method used to select study respondents from the target population. Data collected from the representative sample is analysed to estimate the characteristic of the whole group (Mills, 2014). The use of a sample is justified, especially in studies where data cannot be collected from every member due to the large size of the target population. The following section discusses the selection criteria that was used to select a sample for this study.
3.5.1 Sample and Sample Size

A sample is a proportion or section of the target population (Dodgson, 2017). Other scholars refer to it as a finite portion of the statistical population under investigation with the aim to gain information on a specific aspect concerning the whole group (Roller & Lavrakas, 2015). In this study, a sample therefore refers to the people who provided data for this study. The rationale for using a sample in this study was to avoid the superlative of using the whole target population (Dodgson, 2017). This study did not attempt to collect data from every artisanal gold miner, local people or environmentalists in Chegutu District. This was not possible due to the infiniteness of the target population. It was from such a backdrop that the sample used in this study appears small.

The issue of sample size is a contested area with no immediate convergence of views expected in the near future. However, this study adopted the widely agreed perspective that what is crucial in qualitative research studies is not the actual size of the sample but the depth of data that is collected (Dodgson, 2017). In qualitative studies, the size of a sample has no bearing on the outcome of the study. For example, in a case study, the sample could be as small as just one respondent. The sample could also be just as many but emphasis remains on quality of data collected (Elmusharaf, 2012). It is from these assumptions that principle of proportionality which is critical in quantitative research methods, was not considered in deciding the sample for this study (Creswell, 2015). This study employed the saturation point technique as a basis for deciding the sample size. Saturation is defined as a situation where a study set out to obtain comprehensive and in-depth data from participants to a point where no more new information is emerging from subsequent respondents (Creswell & Plano Clark, 2011).

Since this study is a case study, it was therefore appropriate to use a small sample namely one specific area, Ward 22 of Chegutu District and a saturation point determined sample. It was by design that this study never intended to generalise its findings since gold rich areas are differently affected in terms of environmental degradation. The primary intention of the study was to illuminate the environmental problems pertaining in Ward 22 of Chegutu District, with a view to recommend strategies that could adopted to conduct AGM in this area in a sustainable manner.
3.5.2 Sampling Technique

The used purposive sampling and saturation point sampling techniques to come up with its sample. Purposive sampling is a qualitative sampling technique in which the researcher selects the study site and informants for their ability to provide expert information on the issue under study (Creswell & Poth, 2017). To understand the causes of environmental degradation in Chegutu District, the study engaged key informants drawn from artisanal gold miners operating in Ward 22, community leaders in this area and officials from this district. Respondents were interviewed up to the saturation point.

Like any other sampling technique, purposive sampling is criticised for its weaknesses, especially for the perceived researcher bias inherent in its methods (Marshall and Rossman, 2011). The study mitigated the weaknesses of purposive sampling through triangulation of data collection methods (Elmusharaf, 2012). The study used direct observation to complement the accounts given by participants.

3.6 Ethical Issues

For a research to be credible it must be guided by ethics. As such this research was guided by ethics. Ethics in research refer to acceptable and unacceptable behaviors that should be observed when conducting research. These ethics include confidentiality, honesty and integrity, anonymity, informed consent and right to privacy among many others (Creswell & Plano Clark, 2011). In order to build confidence and trust, participants were informed about their rights as a basis for conduct of the research. They were informed that: they have the right to withdraw at any stage should they feel uncomfortable with the research; that the dignity and rights of all participants were to be upheld throughout the research process; and that the information gathered from them would be confidential and as such would only be used for the purpose of this research. They were also assured that no information linking them to the research would result from this research.

3.7 Validity and Reliability

Validity and reliability issues are cornerstones for any research study. Validity determines suitability of methods used for gathering relevant and intended data while reliability is concerned with consistency of instruments in producing similar results if administered to homogeneous
respondents at different times (Creswell & Plano Clark, 2011). This study pilot tested the data gathering instruments before they were administered to the actual study sample. The pilot test was conducted in Chakari, one of the AGM areas in Chegutu District. This was done with the intention to detect errors and ambiguity in interview questions. The methods and instruments were found to be satisfactory and were eventually administered to study participants in Ward 22.

3.8 Data Presentation and Analysis Procedures

This study presented data using the description of the data collected by way of in-depth interviews, field observation and desk research. For illustrations and summarisation, the study used graphs, images and tables to present data in simplified form for clarity and ease of understanding. Since data was collected through interactive methods, the study employed content, narrative and discourse data analysis procedures. Content analysis was used to categorize and summarize the data for inductive purposes (Levitt et al, 2016). Using this procedure, data collected from all the data collection methods and research instruments were grouped in themes and analysed. Narrative analysis was also applied to enhance, reshape and reflect on data collected from participants (Holstein & Gubrium, 2011). Finally, discourse analysis was used to make sense out of the mass of data that was collected.

3.9 Chapter Summary

This chapter discussed the methodologies that were used in this study. A case study research design was used to get in-depth understanding of environmental degradation arising from AGM activities in Ward 22 of Chegutu District. The qualitative research method was discussed, relating it to how it was used in this case study. The data collection methods, namely in-depth interviews and in situ observation used in this study, were discussed in this chapter. The chapter ended with a brief discussion on how the collected data was analysed and presented.
CHAPTER FOUR
DATA PRESENTATION AND ANALYSIS

4.0 Introduction

This chapter presents data in thematic form. Thick descriptions were used to present the analysed data from a mass of collected data. Tables and figures were also used to simplify some of the data for easy of understating. The names used in this chapter are not the real names for the participants. This was done in order to preserve the anonymity of the respondents, their personal integrity and privacy among other ethical considerations.

4.1 Demographic Profiling of Participants and Response Rates

A total of 12 respondents participated in this study. The study sample was determined by the principle of saturation point. In-depth interviews were administered to 7 artisanal gold miners, 3 community leaders and 2 environmentalists. In the category of artisanal gold miners’ respondents, the saturation point was reached at respondent number 5. The last two respondents in this category were merely repeating the same information that was already extracted from the first five respondents. With this backdrop, the sample size in this category was set at 7 participants. The study managed to interview all the 3 community leaders and 2 environmentalist as was expected. The response rate for this study was therefore considered to be high because the respondents were available for the interviews on their respective appointed times. Table 4.1 below indicates category of respondents by gender.

Table 4.1:  Category of Respondents by Gender

<table>
<thead>
<tr>
<th>SER No</th>
<th>RESPONDENTS</th>
<th>MALE</th>
<th>FEMALE</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Artisanal Gold Miners</td>
<td>5</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>Community Leaders</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Environmentalists</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td><strong>Grand Totals</strong></td>
<td><strong>8</strong></td>
<td><strong>4</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

As shown in Table 4.1 above, the study could not achieve a gender balance in terms of participants. Women participants constituted 33.3% of the total sample. This was because AGM
activities in Ward 22 were conducted in seclusion and few women were directly involved in the extraction of gold processes. However, more women were involved in ancillary activities such as food vending. These could not be included in the sample because of their limited involvement in the actual AGM activities.

The age range of participants was 22-54 years. Six of the respondents fell in the 22-38 years age group, while the other 6 respondents were in the 40-54 age group. This implies that the data provided from this sample was representative to the general age groups involved in AGM in this particular area. The information was therefore considered to be rich because it was provided from people who had a mixed range of experience of active engagement in AGM activities.

Table 4.2: Participants’ level of Educational

<table>
<thead>
<tr>
<th>SER No</th>
<th>‘O’ LEVEL</th>
<th>‘A’ LEVEL</th>
<th>DIPLOMA</th>
<th>DEGREE</th>
<th>TOTAL RESPONDENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>12</td>
</tr>
</tbody>
</table>

The level of education attained by the respondents as shown in table 4.3 above, indicates that the respondents were qualified enough to understand the research topic and the subsequent interview questions. Such an understanding was required in order for the participants to provide relevant and in-depth answers to the question items on the interview guide.

Table 4.3: Data Matrix Table

<table>
<thead>
<tr>
<th>SER No</th>
<th>METHOD</th>
<th>INSTRUMENT</th>
<th>DATA SOURCE</th>
<th>DATA TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Desk Research</td>
<td>Researcher</td>
<td>Current literature</td>
<td>Qualitative</td>
</tr>
<tr>
<td>2</td>
<td>Interviews</td>
<td>Interview Guide</td>
<td>(a) Environmentalists (b) Artisanal Miners (c) Community leaders</td>
<td>Qualitative</td>
</tr>
<tr>
<td>3</td>
<td>Observation</td>
<td>Researcher</td>
<td>Ward 22 (in situ)</td>
<td>Qualitative</td>
</tr>
</tbody>
</table>

As shown on the data matrix table above, the study triangulated three data gathering methods to collect data. A thorough desk research was conducted through an elaborate literature review of
related studies on environmental issues arising from AGM activities. The review covered contemporary literature and case studies at global, continental, regional and national levels. This was followed by in-depth interviews which involved artisanal, community leaders and environmentalist based in Chegutu District. In situ observations were conducted to validate themes which emerged from the first two data collection methods.

4.2 Forms of Artisanal Gold Mining in Chegutu

Different methods were used by different people to extract gold in Ward 22 of Chegutu District. The forms of mining appears to be determined by the tools available to different miners. Most of the participants were not able to accurately identify the forms of AGM conducted in this area. They identified the different forms of AGM under the generic name ‘gold claims’. However, their descriptions of the mining activities and the in situ observations were adequate to enable this researcher to categorise the mining activities under two specific forms. Additionally, the two EMA officials helped to classify all the AGM activities in Ward 22 as falling under either alluvial gold mining or hard rock gold extraction. The views of participants on forms of AGM in Ward 22, Chegutu District are presented below.

Fig 4.1: Alluvial gold panning on dry land.

The two environmentalists who were interviewed agreed that alluvial gold panning was widely practiced in Ward 22. They indicated that almost everyone in this community was involved in alluvial gold panning. This has become the major source of livelihood for many people who
come from as far as the country’s borders in search of this precious mineral. According to these two respondents, the people who descend on Chegutu District, including Ward 22, are mostly unemployed people who were mostly seeking for opportunities to survive. They had no capital, machines and had no other means of survival so they either go it alone, in search of gold in river banks or they are employed by those who have established themselves in panning. One environmentalist indicated that gold panning was widespread along Mupfure River. He said that this river was one of the biggest rivers in Chegutu District and that it flows through Ward 22. He claimed that the river was rich in alluvial gold deposits and that it was where people in the Ward were spending most of their time panning (see fig 4.2 below). He had this to say about alluvial gold panning in Mupfure River:

_Mupfure River holds thousands and thousands of ‘makorokoza’, Shona name referring to gold panners. Gold panning is the only way most of the local people in Ward 22 can afford because they don’t need expensive tools to extract gold from the river. The gold is found on the river bed hence panners simply use domestic utensils such as dishes, buckets and plates to get the river bed sand, which contains the alluvial gold. They process it using the same river water and get fine gold dust which they further process using chemicals or fire. This form of gold extraction is not mining, that’s what we call illegal panning._

Interview with Chekai, EMA official, in Chegutu, on 25 August 2018

**Fig 4.2:** _Alluvial panning in Mupfure River with James’ table on the right._
The sentiments expressed by Mr Chekai, confirms Kori (2006), who theorised that gold panning was a form of gold extraction which is widely used by predominantly poor people to extract alluvial gold deposited in riverbanks and streambanks. The respondent’s sentiments were also validated through observations made on miners working along Mupfure River. The researcher observed widespread use of rudimentary tools which featured prominently in the reviewed literature under gold panning as a form of AGM. Furthermore, most of the interviewed community leaders and miners confirmed that extraction of gold from rivers was mostly through the panning method.

4.2.2 Hard Rock Gold Extraction

Hard rock gold mining is another form of gold extraction used by artisanal gold miners in Chegutu District, Ward 22. According to participants, this method was used by small scale mining operators who had the capacity to dig deep and follow gold rich belts underground. Interviews and observations revealed that there was only one gold mine in Ward 22, which meet the category of small scale mine. In an interview with a participant, who was the owner of the only small scale gold mine in this Ward, he explained that hard rock gold mining was lucrative but is used by miners with capital to invest in mining equipment and machinery such as excavators, graders, loaders and trucks among other heavy duty mining machines. This respondent had this to say about hard rock gold extraction in this ward.

*My gold mine uses the hard rock gold extraction methods because it is lucrative. It has high gold returns but it is expensive that’s why few artisanal miners cannot afford it. High quality gold is found encased on rocks which are as deep as 30 meters underground or more. You cannot dig to that depth using picks, shovels and hoes. You need heavy duty machinery because of the work that is required to get to the underground rocks. The depths involved also requires extra safety measures such as interior support systems to prevent collapse of the tunnels. You are also require to put in place control measures to control high underground temperatures for the safety of workers. This is the reason why this type of mining is beyond most artisanal miners in this Ward.*
Interview with Kangwa, small scale gold mine owner in Ward 22, Chegutu District, on 9 August 2018.

The sentiments expressed by Kangwa, were also echoed by other respondents who said only those with money to buy mining equipment were in a position to dig deep for high quality gold which was found in rocks. The rocks were then crashed in order to separate the gold from the rocks. Participants indicated that in order to get to the depth where the rocks are found, one requires machinery to excavate, dig, drill the rocks, bring them out of the mine and then take the rocks to the gold mills for crashing. The Danangwe District Youth Mining Cooperation (DDYMC) in Gadzema village of ward 22, was engaged in hard rock gold extraction. It was observed during field observation that the mine had modern mining equipment consistent with the descriptions of hard rock gold extraction methods. The tunnels were deep and steep, taking a deviation from the other forms of AGM in the same ward. The researcher observed that mining activities at this particular mine were capital extensive as evidenced by the range of mining machinery and equipment on the site. This appears to be the reason why there was only one such mine in Ward 22, even if this was said to be the most lucrative form of gold extraction.

4.3 Why AGM is not environmentally sustainable

Considering the fact that AGM was accused of not being environmentally sustainable, the researcher sought to establish the reasons behind that lack of sustainability. The respondents highlighted three main challenges namely high input costs, bureaucracy and lack of political will. Their point of departure was that the three factors left them with no resources to mine in an environmentally sustainable way. This supported what Gutu (2017) found out in her study, the issue of high input costs bureaucracy and lack of political will which caused the costs of compliance to become too high for prospective miners leading to them conducting unsafe environmental practices.

4.3.1 Input costs

The researcher inquired what costs the miners faced. All the seven miners and a community leader could indicate the costs involved in artisanal mining before one is licenced to start operations. One respondent pointed out that “...zvinhu zvinotidhurira kuti upinde mumining. Kuti uvhure mugodhi unoda $200 yellicence yekupega, $500 ye pegging fees kozoti $200
yeconfirmation of vacancy saka unozongoona kuti better kungoita zvechikorokoza”. (It’s expensive to start mining. To open a claim one requires $200.00 for pegging licence, $500.00 for pegging fees and $200.00 confirmation of vacancy of claim so you end up resorting to gold panning). This indicated the costs involved for one to start mining legally input costs put a heavy demand for financial inputs on the miners. Another miner went further to say, “..ndizvo zvinokonzera umbimbo ndokusaka muchiona small scale mine yeArtisanal ingori one muChegutu iyo DDYMC”. (This is what causes unruly behaviour. That is why you see small scale mine in AGM being just one in Chegutu- the DDYMC). The respondent highlighted that this often led to illegal activities as seen by the fact that in Chegutu District, artisanal miners could not meet the financial requirements to enable them to mine according to the laid down procedures.

4.3.2 Bureaucracy

The respondents highlighted that the issue of bureaucracy was a contributory factor to unsafe mining practices as it drove away miners from legal processes as one miner lamented, “Iko kufambira mapepa acho unotoinda kuKadoma, Chinhoyi nemuChegutu. Munongoziva zvinoita vanhu vehurumende havamboziva kuti munhu anenge abva kupi unotova muswere. Ko iyo mari yebhazi hayo”. (To get the papers processed one has to go to Kadoma, Chinhoyi and Chegutu. You know what happens with civil servants, they do not care how far one would have travelled, it’s a matter of spending the whole day. Consider the travelling expenses also). The miners pointed out that most of the prospective miners ended up abandoning the process which forced them to operate illegally. A community leader pointed out that those who persisted in legalising their activities sometimes ended with little or no money at their disposal to pursue mining activities in a safe and sustainable manner.

4.3.3 Lack of political will

Another crucial issue affecting AGM was that of lack of political will. The community leaders pointed out that government agencies tasked with the role of dealing with AGM were not able to adequately carry out their role. This point was confirmed by the researcher after visiting the alluvial gold panning activities along Mupfure River in Ward 22. Those alluvial gold panners along Mupfure River pointed out that they had never seen government officials in that part of the Ward. “Kuno veEMA hatisati tambovaona tinotovadawo kuti vatiudze mashandiro”. (Here we
have never seen the EMA people, we also want them so that they advise us on how to work). This was one panner from Mupfure River who confirmed that EMA officials had never patrolled along the river. Even the EMA official in his in-depth interview confirmed that there was no alluvial gold mining activity along Mupfure River. He said “Aah there is no alluvial gold panning in Chegutu district. I have never seen any panners along this river”. This was after the researcher had observed panning along the Mupfure River when the researcher had asked the EMA official what action they were doing to stop alluvial gold panning along the Mupfure River. This clearly confirmed to this researcher that there was no political will to supervise environmental activities in the district. This was a confirmation of what was pointed out by Mawowa (2016) among other scholars who pointed out that government officials were complicit in environmental degradation by artisanal miners through abrogation of their duties.

4.4 Environmental Problems Caused By AGM in Ward 22 of Chegutu District.

In Ward 22, gold deposits are found naturally in riverbeds, streambanks river crevices and deep depressions between high ground. This is the abundance of gold that attracted thousands of artisanal miners to this ward. This has overwhelmed this area as depicted from the various forms of environmental degradation characterising the area. Participants attributed this problem to many factors which are directly linked to AGM activities in this ward. Some of the major factors mentioned and observed include indiscriminate cutting down of trees, land degradation and water pollution among other factors affecting ecosystem balance. Participants had different perceptions on the impact of AGM on such acute environmental degradation in this Ward. Three major environmental degradation themes emerged from the interviews and in situ observations conducted in this Ward. Land degradation, water pollution and deforestation appeared to be the major environmental concerns raised by participants. The views of participants on these factors are discussed below.

4.4.1 Land Degradation

One respondent from EMA explained that AGM has attracted thousands of people into Chegutu District including Ward 22. This respondent had vast knowledge on issues of environmental management and challenges encountered in Ward 22 on account of AGM activities. He pointed out that the lack of specific environmental management in Chegutu in general and Ward 22 in
particular, was like a time bomb waiting to explode. He went on to say that the number of artisanal miners in this Ward was not sustainable hence the accelerated land degradation. To this respondent the people were being pushed into AGM because of the need to irk an honest living under the prevailing hard economic conditions characterising the period under study. This respondent’s assessment agrees with the SLF in that AGM in Ward 22 was driven by the desire to sustain peoples’ lives. However, AGM activities in this particular ward were violating some critical elements of SLF in that the way it was being conducted was not sustainable. There were no doubts that many households in Ward 22 and beyond were dependent on AGM, the problem was on the sustainability of this environment in the absence of effective environmental mining practices. One participant had this to say in this regard.

There is only one gold mine in Ward 22. This mine is owned by a cooperative and it’s called Danangwe District Youth Mining Cooperation. This small scale gold mine is located in Gadzema, one of the villages in ward 22. It is the only artisanal gold mine which conduct its operations in a sustainable manner. The rest of gold miners here are just makorokoza (panners). Most of these makorokoza employ unorthodox means to get gold. They don’t have the necessary equipment so they use hoes, shovels, picks and any other homemade tools to dig everywhere, searching for gold. When they have exhausted one claim, they move onto the next without any form of land reclamation. To make things worse they cut down trees to burn their gold during the gold purification process. This has turned this area into a land of holes and trenches. The area now resembles a desert with sand dunes. Very soon the area will not be usable for productive purposes because of the indiscriminate digging and cutting down of trees.

Interview with EMA official in Ward 22, on 10 August 2018.

The issue of indiscriminate digging and lack of land reclamation was also raised by the three community leaders. They expressed their concern on the amount of mines which were abandoned without filling up the holes. This problem was said to cause the depletion of grazing pastures and fields for crop production. One participant attributed the problem to the conduct of what he termed ‘unruly makorokoza’. The respondent revealed that some of the people who
came to Ward 22 in search of gold, abandon the search for the precious mineral and diverted their efforts to cutting trees to sell as firewood. According to these community leaders, cutting trees for firewood business and clearing of trees for mining activities have caused rapid deforestation in Ward 22, creating further room for more digging. One of the leaders bemoaned that;

Makorokoza atiuraira dunhu redu, vanwe vanotema miti yekupisa goridhere ravo, vanwe vanotemawo miti vachitengesa huni marokeshini eku Chegutu. Vanongochera pese pese vachisiya makomba. Nvimbo yose neminda yedu angova makomba ega ega. Dai hurumende ichisunga vanhu vakadai. Miti yedu yapera muno, minda haichirimike

(Gold Panners have destroyed our area, others cut down trees for purifying their gold, others cut trees for firewood selling in locations in Chegutu. They just dig everywhere, leaving pits. The whole area including our fields, are just holes only. If only the government could arrest such people. Our trees are finished, our fields are no longer productive).

Interview with Ward 22 community leader, on 5 September 2018

**Fig 4.3:** Typical artisanal mining site in Ward 22.
Artisanal gold miners who participated indicated that while AGM was causing land degradation (as seen on fig 4.3 above), they had no option because their livelihoods depended entirely on AGM. Some interviewees in this category of participants were of the view that while land degradation was caused by AGM, there were other actors as well. They claimed that farm brick makers were also digging and leaving open pits because they would have used the soil to make the bricks. Those in the business of bricks were also said to be the chief culprits in cutting down of trees which they use for burning their bricks. Firewood sellers were also blame for causing land degradation in ward 22. Those in AGM explained that artisanal miners dig downwards hence they cause little land degradation. However such claims were not reflecting what was existing on the ground. Widespread excavations were observed, with many such sites abandoned. The miners explained that where they were mining, they try to preserve the environment. However, they acknowledged that AGM was causing land degradation through digging of mine tunnels, a problem which they think was unavoidable because they had to follow gold belts. They also blamed the local people for causing land degradation because of their farming methods. New fields were opened in an unsustainable manner every year as a way to look for fertile agricultural land. The farmers were said not to be practicing good farming practices. The interviewees cited the fields in Ward 22, which appeared everywhere as good evidence to substantiate their claim. While this claim was verifiable, the unregulated digging, coupled with absence of land reclamations in abandoned mines appeared to be the major causes of land degradation in Ward 22 (as seen on fig 4:3 above).

4.4.2 Water Pollution

Participants were agreed that water was a critical element in AGM operations. They indicated that processing of gold was largely not possible without water. One interviewee explained that water was used in the primary stages of processing to separate gold from soil and crashed rocks (ore). Gold panners working in Mupfure River were observed separating alluvial gold from sand using water. These miners conducted their processing right in the river while some processed from the river banks. It was also observed that some of the artisanal miners were using chemicals including mercury and cyanide. After gold has been separated, the remaining matter is discarded on river banks. Some miners just throw it back into the river. During an interview, one community leader claimed that dead fish which were found in rivers and dams in Ward 22,
indicated that water in these sources was contaminated with chemicals used by artisanal miners. This could be confirmed by the turbid water that could be seen in several parts of the Mupfure River. One community leader further claimed that locals were afraid of using such water because they were convinced that the chemicals used by artisanal gold miners have contaminated most sources of water in their area. This claim echoed the findings of several studies carried out in AGM areas. For example, a study carried out in Penhalonga by Gutu (2017) established that water in rivers, boreholes and streams around this gold rich area was polluted by chemicals used in gold processing. The community leader had this to say about water contamination in Ward 22 of Chegutu District:


(Gold panners have spoiled rivers in this area. The chemicals they use including mercury and cyanide, is poisonous, it kills trees, grass, fish and our livestock. Water in Mupfure River is no longer drinkable. Agricultural extension officers have since encouraged us to give our animals borehole water. We don’t know where they get these chemicals which have spoiled our area. The government must arrest these people who use such chemicals in their gold mining).

The sentiments expressed by the community leader reflected the views of most the participants. Most of them thought that most water sources in the ward were contaminated by chemicals used in gold processing. The practice was said to be widespread because the chemicals were found to be effective in separating gold from the ore. Some participants said that they were now suspicious of all water sources in Ward 22. They indicated that artisanal gold miners, including the locals were in the habit of using the same chemicals to purify gold hence the high probability of contamination of all water sources in the ward. They claimed that even boreholes were not spared as people fetch water from them to process their gold. These claims were validated by
heaps of soil which were located close to two boreholes in the ward. During field observation some miners were seen carrying out gold processing activities some 100 meters from a borehole. The use of poisonous chemicals in close proximity to water sources was likely to result in the contamination of the underground water.

The EMA officials confirmed that the use of chemicals by artisanal gold miners in Ward 22, Chegutu District, was problematic. During an interview, one EMA official explained that mercury and cyanide were classified under dangerous substances and they were outlawed. However, the miners in this ward were said to use the chemicals without due diligence to health problems arising from their conduct. The official indicated that the local people in this area were found it increasingly difficult to access clean water for their domestic requirements. This respondent explained that chemicals used in this ward were not only contaminating water in this area but also downstream water sources. This was said to be the reason why fish were sometimes found dead along Mupfure River. That was an indication of the extent of water pollution in ward 22, Chegutu District, as a result of poor AGM mining practices.

4.4.3 Deforestation

The magnitude of deforestation in Ward 22 Chegutu District, has reached alarming levels. Participants explained that AGM operations use a lot of timber for underground props. The majority of artisanal gold miners in this area depended on indigenous trees for supporting their mines to prevent curving in of tunnels and eventual collapse. Participants claimed that most miners in this community had no alternative sources of timber hence they were using local trees. Some of the participants bemoaned how AGM has caused the massive deforestation in Ward 22 and how this has negatively affected the environment and its ecosystem. It came out during the interviews that trees were being harvested without any plans to replace them. It was claimed that the resettled farmers were at the forefront of the problem because they were selling trees to artisanal gold miners for various uses. When asked about the source of the timber used for underground props one miner had this to say;

*We buy gum poles from farm owners but these days the gumtrees are expensive because they are depleted. They are difficult to get so we now use even indigenous trees as long as they are strong enough to support our mines. We go*
to the newly resettled farmers who give us areas where they want cleared in preparation for farming. That’s where we cut the poles we require. We also cut more trees for future uses because the forests are dwindling fast. So once you agree with the farmer, we hire unemployed youths in the area to cut as much trees as possible. We can sell the extra poles to other miners who need them.

Interview with a gold mine owner, on 10 September 2018

There were however, contradicting answers to the source of timber used by the miners. While the miners claimed that they buy the poles, the community leaders blamed the miners for the massive deforestation. They claimed that the miners were engaged in indiscriminate cutting down of trees against the EMA laws. The leaders said no one was allowed to authorise the miners to cut trees for use in their mining activities. One interviewee pointed out that some of the miners resort to the business of selling fire wood after failing in their search for gold. The firewood business was said to be thriving as more wood was used by those involved in preparing and selling food to miners at all sites conducting mining activities. Many food vending activities were witnessed at all the sites visited by this researcher during field observations. It was observed that wood was used in the cooking of food and that some of the vendors were using wet and freshly cut wood for cooking.

4.5 Local initiatives to Make AGM Environmentally Sustainable in Ward 22 of Chegutu District.

Artisanal gold mining in Chegutu District, Ward 22 appears to be the root cause of environmental degradation in this community. The economic gains accruing to households depending on AGM in this area are monumental. The same can be said about its contribution to the national economic trajectory. For example, gold that was produced by AGM in 2017, inclusive of gold from Chegutu District, was recorded at 13.2 tons against the 11.2 tons produced by established gold mines. This vital contribution by AGM must however, not be allowed to overshadow the importance of preserving the environment for posterity and benefit of future generations. The study sought to find out from the respondents what initiatives they thought could help to ensure that AGM in Ward 22 was conducted in an environmentally sustainable way. Four strategies were derived from the data that was collected through desks research,
depth interviews and observations which were conducted to address this objective. These include the reduction of AGM operators in Ward 22, use of appropriate mining technologies, harmonisation and enforcement of mining laws, financial and technical support by government. Some of the above strategies were analysed using responses from participants.

4.5.1 Reduction of AGM Operators in Ward 22.

The number of artisanal gold miners in Ward 22 was not known. The number was believed to be in excess of a thousand actors. Such a number was too huge and unsustainable in an area of the size of a ward. The miners were simply too concentrated hence causing too much strain to the environment and its natural resources including its gold reserves. Participants were of the view that, government was to reduce the number of people mining gold in this ward in order to save the environment from further deterioration. One community leader claimed that people come into the ward every day from across the country in search of gold. There was absolutely no control and it was the environment that was suffering as a result of lack such control measures. Like other respondents, the leader thought that AGM in this ward required strict controls and only a limited number of operators were to be given mining licences so that they can be held accountable if they violate sustainable environmental management practices. At the moment there were no such controls and no one took responsibility for the ongoing acute environmental degradation.

4.5.2 Deployment of Appropriate Technologies

Participants indicated that AGM can be conducted in an environmentally sustainable way if appropriate mining technologies could be availed to them. It was revealed that out of several gold miners in Ward 22, only one was using appropriate mining equipment. Respondents claimed that DDYMC, was using a variety of mining equipment and it was operating profitably. Although the mine was estimated to employ around 6500 people, it was doing so in an environmentally friendly manner. This was also supported by EMA officials who praised this mine for its adherence to environmental laws. Observations showed that the environment around the mine where the DDYMC is based, was the best preserved throughout the whole ward 22. There were no abandoned pits and the forests were still intact.
Interviews and observations also showed that DDYMC used water in its mills to process gold. The mine it had devised a method of circling tanks which ensured that water was recycled and remained in the tanks. This prevented contaminated water from escaping into the environment thereby protecting other users of the environment and vegetation from being negatively affected by chemical water. The environmentalist from EMA indicated that the circling method was environmentally friendly as opposed to the dumping of waste water which was used by the majority of miners in this ward. The DDYMC miners acknowledged that adopting the circling (of water) method in this ward will not only result in economic prosperity for the AGM operators but it also entails sustainability of a healthy environment for the benefit of future generations.

4.5.3 Harmonisation and Enforcement of Mining and EMA Laws.

Environmental degradation in Ward 22, Chegutu District could be driven by lack of half spirited will to enforce both environmental management regulations and mining laws. These two appear to contradict each other and AGM operators seem to capitalise on such weaknesses. This has given the miners a leeway to wantonly decimate the environment without due regard to sound environmental practices. Participants indicated that one such contradiction is found on the differing definition of what and who is an artisanal gold miner and who is not. For example, the Ministry of Mines and Mining Development (MMMD), categorise artisanal gold miners as small scale miners. They define a small scale miner as an “indigenous person employing not more than 50 people, on a registered mining location of not more than 40 hectares” (Mines and Minerals Act, 2015). On the other hand, EMA regulations define the same artisanal miner as a “miner who carries out mining activities using simple tools” (Environmental Management Agency, 2014).

These regulations are violated willy nilly. In ward 22, no one observes these regulations. The majority of AGM operators in this area were not registered as required by the MMMD. Out of the several AGM operators in this ward, only DDYMC appears to be registered. Furthermore, some operators employ more people than stipulated for AGM category. This could be the reason driving the high level of environmental degradation in the area. For example, DDYMC is regarded as an AGM but it is reported to have an estimated 6500 miners. Some of the miners don’t even have what can pass as a ‘simple tool’ yet they claim to be artisanal miners to justify their illegal activities which are harmful to the environment. This problem can be solved by harmonisation of the Ministry of Mines and Minerals and EMA regulations so that they can read
from the same script for the purpose of strict enforcement of laws. Doing so will go a long way towards enforcing the sustainable use of resources in a way that preserve the environment for posterity.

4.5.4 Financial and Technical Support by Government.

The problems affecting AGM were also blamed on lack of technical and financial support by government. On all the sites conducting AGM there was no miner who confirmed that they had received government assistance. This was despite the fact that government is reportedly putting a lot of money into small scale mining and artisanal mining.

Even respondents from DDYMC highlighted the problems of lack of funding and the need for financial injections by government to shore up their resource base. Two of the respondents from DDYMC highlighted the requirement for financial resources from government. The senior one pointed out that, “We are a sleeping giant, if the government could fund this project lets say to the tune of $100 per each of the 6500 miners at this mine that could give us a significant base from which to operate. We can easily pay back that money with time”. Whilst the other said, “Tinongonzwa kuti hurumende yaisa mari mu-artisanal nguva asi kuiwana kwacho ma-one. Kuisa mari mu-mining ndiyo chete nzira ingaita kuti AGM isumukire”. (We only hear that the government has put money into AGM time and again but to get the money seems very difficult. Funding AGM is the only way to develop artisanal mining). The contributions from these respondents highlighted the importance of funding AGM which was absent in Ward 22 of Chegutu District. This confirms what Matimaire (2018) pointed out in respect of AGM. He said that small scale miners (SSMs) required support in terms of funding and equipment to make them more productive and conscious of their environment. A respondent from DDYMC pointed out that AGM was quite a lucrative business and that finance houses should be roped in to fund mining activities. He pointed out that the financiers would then collect their money from the sales when the miners are paid out by fidelity thereby ensuring that their monies would be paid back in time.

4.6 Chapter Summary

This chapter provided the essence of the research activities of the impact of AGM in Ward 22 of Chegutu District. Data was presented using descriptive analysis and tables. This study
established that basically there were two forms of AGM in Ward 22 of Chegutu namely alluvial and hard rock/reef mining. Alluvial gold mining was the most common because it required minimum capital input but it caused the worst environmental damage. AGM was found to be unfriendly to the environment due to high input costs, bureaucracy and lack of political will. The major environmental problems caused by AGM were identified as land degradation, deforestation and water pollution. Unless these were addressed AGM was likely to result in wanton destruction of the environment in Ward 22. Besides the cooperative mine DDYMC there were no meaningful initiatives done to reduce environmental damage in Ward 22. The study found that initiatives which could help conserve the environment were: reduction of the number of artisanal miners in the ward; deployment of appropriate technologies; harmonisation and enforcement of mining and EMA laws; and provision of financial support by government.
CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter is made up of the summary, conclusions and recommendations of this study. The first part of this chapter summarises the whole study. It is followed by a section on conclusions of the study. Recommendations of the study are given towards the end of this chapter. The chapter will conclude with suggested areas for further research.

5.1 Summary of the research

The research aimed to investigate the impact of AGM on the environment in Ward 22 of Chegutu District. Chapter one of the research outlined the background and the reason for the research. It presented the general organisation of the research thereby putting the research into context. The purpose of the study and statement of the problem were also discussed in order to ensure that the reader is able to know that there is something wrong and action needed to be taken. The significance of the study, the research objectives and research questions were also highlighted in order to indicate what the research sought to address. The significance of this study was that AGM was an important shock absorber in the face of stresses like shocks (droughts and floods etc) and seasonality (dry weather) which robbed the citizens of Ward 22 of their life support systems thereby leaving AGM as the only livelihood support mechanism of choice. The chapter also outlined the delimitations of the study to show the parameters under which the study operated. Limitations were also presented and key terms were also explained. The chapter concluded by indicating a brief outline of the five research chapters one to five.

In chapter two the research discussed the theoretical frame work and the literature review. The SLF was used to guide the research. The SLF espoused the fact that there was a close relationship between exploitation of natural resources to support livelihoods and sustainably maintaining the same environment. This theoretical frame work was chosen because of its emphasis on the interplay between resources exploitation and maintenance of the environment. This was evaluated in terms of the interrelationship between the Micro and the Macro. This relationship highlights how Macro-level policies affect the Micro. Practically a discord between
the Micro and the Macro was likely to lead to conflict. The research also highlighted that between 2006 and 2013 artisanal mining was characterised by bans and unbanning. This showed the discord at the Macro level. This was a major contributory factor to the environmental degradation caused by AGM as most minors had no faith in government support in their activities. Researchers such as Spiegel (2015), Chazovachii (2013) and Bello & Bybee (2014) among others point out the difficulty of separating the local people from AGM in the face of loss of employment, droughts and floods among other ills. This highlights the importance of sustainable use of natural resources. However it was this sustainable exploitation of resources that was found to be lacking in Ward 22 of Chegutu.

This study was guided by SLF theoretical. The SLF was built on critical features including people centeredness, dynamism and sustainability among other human focused factors. It is positivist in nature and tone because its focus is on strength areas which promote the wellbeing of people in their communities. The primary focus of the SLF is the lives of people rather than the preservation of nature. It is sensitive to the everyday needs of the people and how they must fulfil human needs using local resources. The theory is also conscious of the importance of using the environment in a manner which is sustainable, not only for the benefit of current generation but for the needs of future generations. Whist the foregoing may be true, this research is of the view that the government currently is seized with the financial gains of AGM at the expense of the environment.

There is no doubt that environmental degradation in Ward 22 requires effective measures to address it. For example, the huge number of artisanal gold miners in this particular area. No exact number was known except the estimated 6500 employed by DDYMC. This shows that the total number of miners in this ward alone could be in excess of 10 000 people. Such a huge number cannot be sustained in a small area the size of a ward. Measures to reduce AGM operators in this award can help in restoring the ideal holding capacity of the ward. On the other hand, environmental degradation can be reduced to sustainable levels by adopting appropriate mining technologies which are friendly to the environment. DDYMC has already proved the effectiveness of investing in appropriate technologies as evidenced by its sound environmental management practices. Lastly but not least, participants were of the view that policy contradictions played a part on the prevailing environmental degradation in Ward 22. It was
therefore envisaged that harmonisation of the MMMD and EMA regulations can be part of the solutions to deal effectively with the AGM chaos in ward 22, which was causing unsustainable environmental degradation.

5.2 Conclusions

Artisanal gold mining in Ward 22 is a critical source of livelihood for many households in Chegutu and beyond considering that DDYMC which is in a ward employs 6500 miners. However, the environmental degradation obtaining in that area was not sustainable. This was caused by AGM activities which were largely not regulated. Lack of such regulation has created an atmosphere where artisanal mining has led to environmental degradation through destructive mining methods. To salvage this problem, a raft of measures is required in order to rescue this ward from total ominous environmental degradation. Environmental degradation in Ward 22 was manifesting through AGM inspired land degradation, water pollution and deforestation. The starting point could be the reduction of AGM actors in the ward to a number that is sustainable. Such a measure has the immediate effect of reducing pressure on the natural resources for sustainable livelihoods. The success of adopting appropriate mining technologies has already been proven through the success of DDYMC which was operating in this same ward. This could be adopted as a model. However AGM requires funding to ensure mining is conducted according to regulations. It is pertinent to harmonise all pieces of legislations governing mining in order to facilitate enforcement.

The research established that there were basically two forms of AGM in Ward 22. These were reef and alluvial gold mining. Alluvial gold mining was the most damaging to the environment as it was conducted with degrading effects on both riverbed and dry land panning sites. Dry land panning in some cases ended up as reef mining as the gold reef descended downwards, however the environmental damage would have already been done. Due to the fact that this form of mining was based on the smash and grab tactics there were no efforts to manage the environment because the miners could be here today and gone tomorrow. This was made worse by the fact that should there be a gold burst, a gold rush ensues and panners from elsewhere invade descending the whole area into chaos with no one accountable for the environmental damage. As a result the area is left in a sorry state due to wanton excavations.
Reef mining was mainly conducted by DDYMC whose site at Gadzema showed that with the will and commitment AGM can be formalised. DDYMC achieved that by bringing together 6500 miners to form a cooperative. That cooperative was a success story as miners have managed to work together. That has enabled them to operate in an environmentally friendly manner with EMA coming in now and then to inspect their mine. Considering the current state of damage caused through alluvial mining, there should be concerted efforts by government to discontinue alluvial mining in all its forms because the economic benefits are not worth the environmental damage. However for lack of a better alternative and the failure of past heavy handedness against artisanal mining, the government finds itself in a difficult position to bring order in AGM. The result is the continuous degradation of the environment. There is need for government to stamp its authority in this sector.

This research went on to establish that among other issues, three main reasons contributed to the lack of environmental compliancy by artisanal miners. These were high input costs, bureaucracy and lack of political will. The study concluded that in most cases people who engage in AGM normally have no disposable incomes to invest in mining because such people will be hard pressed to eke a living in difficult times. As a result most of the artisanal miners find it very difficult to find money required to pay for procedures such as registration and licencing fees. This was made worse by the fact that there was travelling involved in the registration process which had cost implications. That process of registration and licencing also involved visiting various offices in Kadoma, Chinhoyi and Chegutu. To the miners this bureaucracy was an obstacle to the smooth conduct of their mining activities which forced them to conduct mining activities in an unsustainable manner. This was made worse by the fact that there was a lack of political will as evidenced by the lack of government initiatives to try and make AGM a well-managed and environmentally friendly business. There were no visible government initiatives to promote AGM in WRD 22 despite the fact that government is reportedly pouring money into small scale and artisanal mining. The miners reported that they only heard that government was investing in AGM but they had never accessed the money. The lack of political will was also evidenced by the abrogation of duty by government officials such as EMA. The research found out that EMA did not have a good grasp of the mining activities that obtained in Ward 22. As a result artisanal miners took advantage of that hence they did not fear to degrade the environment because no one supervised them.
The research established that environmental degradation was inherent to AGM. Among other ills AGM caused land degradation, water pollution and deforestation. In terms of reef mining and alluvial gold panning it was found out that alluvial gold panning was the worst in terms of damage to the environment. This was due to the fact that it was conducted on and along the riverbed and at the surface or just below the surface on dry ground. This means that the extraction activities interfered with the land surface thereby either leaving pits or land bare surfaces which left the land in a compromised position and subsequently unusable for other purposes. Be it along the river or on dry land alluvial gold panning left the land surface unsightly and badly degraded. This is not to mention the associated ills such as loss of aesthetics, water contamination and negative impact on aquatic life. As the miners conduct their activities they depend on wood as a source of energy which leads to the cutting of trees for firewood. This is a cross-cutting issue on all types of mining. Even reef mining whose thrust is underground has negative impacts on the environment as the miners use timber to provide props for support of shafts which leads to cutting down of trees and deforestation in the process. This implies that such trees need to be replaced. However there seems to be no plans in place for afforestation.

In terms of initiatives to mitigate environmental degradation, this research established that there were no initiatives that were being taken to make AGM environmentally sustainable in Ward 22. This was attributed to the fact that the government had abrogated its role due to lack of a better alternative or due to the double benefit of AGM providing both revenue and employment which government found appealing in the current circumstances of joblessness and shortage of foreign currency. The banning and unbanning of artisanal gold mining between 2006 and 2013 that began with “Operation chikorokoza chaperu” or (Operation end gold panning) and the current deregulation are a sign that for all intent and purposes government was not sure of how to handle the regulation of AGM. More so during the current difficult economic situation where government was happy to have people who can fend for themselves reducing the level of unemployment and number of people in need of social benefits/grants. Other countries which have had the same problems with artisanal mining such as Ecuador, Tanzania and Zambia among others mentioned earlier appear to have put in place enabling environments to accommodate AGM with relative success after discovering that heavy handedness did not work. It would be wise for government to take a leaf from such countries because there is no industry to absorb all
the artisanal miners currently conducting illegal mining activities. The best way forward is to try and formalise AGM.

5.3 Recommendations

The study recommends that:

- Government should formalize AGM.
- Government should provide financial and technical support to help modernize AGM operations.
- The process of registration and licensing of mine claims should be more streamlined and brought closer to the people to make the process user friendly.
- EMA should be more active in supervising AGM activities.
- Artisanal gold miners should engage government and other financial partners to help them in acquiring appropriate mining technologies and equipment.
- Artisanal gold miners should adopt sound environmental management practices as an integral part of their operations.
- Alluvial gold panning should be banned.
- Artisanal miners should be forced to adopt the example set by DDYMC for easy management and control.

5.4 Areas of further research

More research is required to establish the level of water contamination caused by AGM in rivers in Ward 22. It is also pertinent to research on how the various alluvial gold panning sites can be converted into organised mining with set structures.
References


Singo, P. (2012). *Small Scale Mining is Here to Stay.* Harare: University of Zimbabwe.


CONSENT FORM

Voluntary participation on a study conducted by Mr. Admore Hozvora, a Bindura University of Science Education masters’ degree student. The research study is on the impact of artisanal gold mining on the environment focusing on Ward 22 of Chegutu District. Information gathered from this interview is for academic purpose.

1. I volunteer to participate on this study as an informant, without any kind of payment in cash or kind. I retain my freedom to withdraw my participation in this research at any time without any penalties. In the same vein, I have the right to decline to respond to questions that I might not be comfortable with.

2. I understand that this research study was approved by Bindura University of Science Education.

3. I understand that my participation in this study involves providing information through an interview lasting approximately 45 minutes per session. I am agreeable to the taking down of notes by the interviewer during the interview sessions.

4. I wish to remain anonymous in the final documents produced through the information I provide to this research. My personal integrity, confidentiality and privacy must remain secured.

5. I understand that the information that I will provide in this interview will be used for academic purpose only as described in this consent form.

6. My participation on this study will not inconvenience me materially, financially or in any way that might compromise my personal integrity.

7. I have read and understood the explanation provided to me. I have received satisfactory answers and assurances hence I append my signature on this form to show my consent to participate in this study.

8. I wish to retain a signed copy of this consent form as proof of my voluntary participation in this study.

Interviewee Signature……………………………………………Date…………………………..

Interviewer Signature……………………………………….........Date………………………….

Interviewer Conduct Details……………………………………………………………………...
INTERVIEW GUIDE FOR ENVIRONMENTAL OFFICERS WORKING IN CHEGUTU DISTRICT.

I am Admore Hozvora, a Masters student at Bindura University of Science Education, Faculty of Social Sciences. This interview was designed to collect data for a study on the impact of artisanal gold mining on environmental degradation, with particular focus on Ward 22 of Chegutu District.

You are invited to participate in this study as a voluntary informant. You shall not suffer any penalties in the event that you find it necessary to withdraw your participation at any stage of the study. All information gathered from you shall be treated as confidential in order to secure your privacy and personal integrity. In addition, your identity will remain anonymous during and after the study. Your participation is greatly appreciated and I hope the information you will provide will contribute towards the successful completion of this study.

INTERVIEW QUESTIONS

1. How long have you been working in Chegutu District?
2. As part of your duties, how often do you visit gold mining areas in Ward 22?
3. What are the forms of mining conducted in ward 22?
4. How do miners acquire gold mining claims in Chegutu District?
5. What environmental assessment procedures are conducted by EMA before prospective miners commence mining activities?
6. How is AGM in Ward 22, affect agricultural activities and other land uses?
7. What are the forms of environmental degradation in Ward 22, which are linked to AGM?
8. What are the effects of chemicals that are used for processing of gold, on the general environment?
9. What strategies are in place to protect water bodies from contamination by chemicals used to process gold?
10. What are the specific and general mining laws that seeks to protect the environment from unorthodox mining operations?
11. In your own view, what can be done to prevent AGM from causing environmental degradation in Ward 22 in particular and Zimbabwe in general?
12. Is there anything important you want to highlight regarding AGM activities and environmental degradation in Ward 22, before we conclude the interview?
INTERVIEW GUIDE FOR MINERS IN CHEGUTU DISTRICT.

I am Mr. Addmore Hozvora, a Bindura University of Science Education masters’ degree student. I am conducting a research study on the impact of artisanal gold mining on the environment focusing on Ward 22 of Chegutu District. The research study will contribute to the completion of a masters’ degree in Peace and Governance. In conducting the research study, I will be bound by ethical considerations to ensure that as a participant you will not be unduly disadvantaged. The research will be conducted on a purely voluntary basis and as a participant you will be allowed to withdraw at any time from the research process should you become uncomfortable with the process of the research. The information obtained will be confidential and will be used solely for academic purposes. No form of identifying feature or aspect linking you to the research as a participant will be attached to this research.

INTERVIEW QUESTIONS

1. For how long have you been involved in AGM?
2. Do you have any form of training in mining?
3. What are the forms of artisanal gold mining that are conducted in ward 22?
4. How are AGM claims acquired in Chegutu District?
5. Can you comment on AGM and its impact on environmental sustainability?
6. What environmental assessment procedures are conducted by EMA before you as AGMs can commence mining activities?
7. Can AGM be conducted without negatively affecting agricultural activities and other land use practices?
8. What forms of environmental degradation can be linked to AGM activities?
9. What strategies have you put in place to protect water bodies from contamination by chemicals that you use to process gold?
10. What are the specific and general mining laws that have been put in place to protect the environment from AGM?
11. What do you as miners do to prevent AGM from causing environmental degradation in Ward 22 in particular and Zimbabwe in general?
12. Is there anything important you want to highlight regarding AGM activities and environmental degradation in Ward 22, before we conclude the interview?
INTERVIEW GUIDE FOR CHEGUTU DISTRICT, WARD 22 COMMUNITY LEADERS.

I am Admore Hozvora, a Masters student at Bindura University of Science Education, Faculty of Social Sciences. This interview was designed to collect data for a study on the impact of artisanal gold mining on environmental degradation, with particular focus on Ward 22 of Chegutu District.

You are invited to participate in this study as a voluntary informant. You shall not suffer any penalties in the event that you find it necessary to withdraw your participation at any stage of the study. All information gathered from you shall be treated as confidential in order to secure your privacy and personal integrity. In addition, your identity will remain anonymous during and after the study. Your participation is greatly appreciated and I hope the information you will provide will contribute towards the successful completion of this study.

INTERVIEW QUESTIONS

1. How long have you been a community leader in this ward?
2. When did AGM started in Ward 22?
3. What is the process of acquiring a gold mining claim here?
4. What are the forms of gold mining in Ward 22?
5. What are the environmental assessment procedures conducted before commencement of mining in this area?
6. How have AGM affected agricultural land in your area?
7. What is the impact of AGM on Ward 22’s natural environment?
8. Miners cut down trees to clear mining areas as well as for the demand of wood for various uses. What measures do you use to control such deforestation?
9. What chemicals are used in the processing of gold by artisanal miners here?
10. What measures are in place to protect water bodies from contamination from chemicals used during gold processing by miners?
11. What are the other environmental problems arising from AGM operations in this area?
12. What advisory role do EMA give to miners as a way to promote environmentally friendly mining activities?
13. In your own view, what can be done to prevent AGM from damaging the environment in this Ward?
14. Is there anything important which you want add in relation to AGM and environmental degradation, before we conclude the interview?