EFFICACY OF THE ENVIRONMENTAL LAWS IN ZAMBIA'S MINING SECTOR

BY

SIMUKALI MULONGWE

A dissertation submitted to the University of Zambia in partial fulfilment of the requirements of the degree of Master of Engineering in Environmental Engineering

The University of Zambia

November, 2022

DECLARATION

I Simukali Mulongwe declare that this dissertation represents my own work, and that it has not previously been submitted for a degree, diploma or other qualification at this or any other University. Except where states otherwise by reference or acknowledgment, the work presented is entirely my own.

Signed …….. Date …….

CERTIFICATE OF APPROVAL

This dissertation of Simukali Mulongwe has been approved as partial fulfilment of the requirements for the award of Master of Engineering in Environmental Engineering by the University of Zambia.

…….. ……

Supervisor Date

……. …….

Examiner 1 Date

……. ……

Examiner 2 Date

……. …….

Examiner 3 Date

ABSTRACT

The continued pollution from the mining activities in Zambia both legacy and current operations is associated with the weak and unclear existing environmental legislation coupled with poor institutional arrangement of enforcement and monitoring. Implementing policies that are weak and not in line with the best international practices can have unintended consequences. One such example is lead contamination in Kabwe District and other legacy environmental liabilities have impacted on the communities negatively (effect of Sulphur dioxide in Kankoyo township of Mufulira) and also the old tailing dumps on the Copperbelt Province have continued to silt and pollute the streams. In the recent past, the Government of the Republic of Zambia has through heft loans from the World Bank attempted to conduct environmental remediation and rehabilitation as a result of both legacy and current environmental liabilities; a situation avoidable if there was an effective environmental framework in place. Therefore, the purpose of this qualitative study which employed case study and phenomenological study designs was to assess the efficacy of the environmental laws in Zambia's mining sector. The research objective was to analyse the extent to which environmental stewardship in the mining sector is applied. This involved answering questions on the extent to which the environmental stewardship was applied, institutional capacity and enforcement procedures, gaps or weaknesses identified and recommendations of best mining practice. Data collection was conducted through desktop reviews for the case study component and through open ended interview questions. Thematic analysis was employed to analyse the data based on common themes and themes formulated from the interview question. The research revealed that existing anomalies and non-compliance could be associated to both lack of good and clear pieces of legislation governing the mining sector, poor institutional arrangement on environmental governance (there is no proper coordination especially with the local municipalities) and irregular of inspections, monitoring and enforcements due to resource constraints. The study recommended that the policy governing environment in the mining sector be revised to respond to current issues, introduce the green court to speedy and strengthen enforcement, decentralise Zambia Environmental Management Agency (ZEMA) and Mines Safety Department (MSD) to have physical presence in all the provinces.

Keywords: Efficacy, Environmental Laws, Pollution, Remediation.

ACKNOWLEDGEMENTS

I wish to express my profound gratitude to Dr. Eng. Ian Nzali Banda for the support, encouragement, timely feedback and guidance rendered to enable me complete my dissertation on time. Heartfelt appreciation to Management in the School of Engineering for well-organized masters programmes and a team of lecturers who run us through our first year course work.

May I also take this opportunity to thank my children Junior Simukali, Miyaze and Moono for the sacrifice made by allowing me dedicate time and resources towards my studies. This will indeed go a long way. Special thanks to all the participants who took time off their busy schedules to be interviewed. I will be failing in my duty if I do not acknowledge and thank my work mates David Mulemena and Miriam Chileshe for the support rendered during my research and all my 2020 intake peers from the School of Engineering at the University of Zambia.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS AND ACRONYMS

APEC	ASIA – Pacific Economic Cooperation
ATO	Australian Tax Office
AUSIL	Australian Legal Information Institute
CEP	Copperbelt Environment Project
CMC	Chingola Municipal Council
DBCA	Department of Biodiversity, Conservation and Attractions
DGMS	Directorate General of Mines Safety
DMIRS	Department of Mines, Industry Regulation and Safety
DRGS	Directorate of Research and Graduated Studies
DWER	Department of Water and Environmental Regulation
ECZ	Environmental Council of Zambia
EEZ	Exclusive Economic Zone
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
EPA	Environmental Protection Authority
EPB	Environmental Project Brief
EPBC	Environment Protection and Biodiversity Conservation
EPF	Environmental Project Fund
EPPCA	Environmental Protection and Pollution Control Act
EPF	Environmental Protection Fund
ESIA	Environmental and Social Impact Assessment

FDI	Foreign Direct Investment
GDP	Gloss Domestic Product
GRZ	Government of the Republic of Zambia
GSI	Geological Survey of India (GSI)
IBM	Indian Bureau of Mines
ICMM	International Council on Mining and Metals
IDA	International Development Association
KMC	Kabwe Municipal Council
LEC	Land and Environmental Court
LgWSC	Lukanga Water Supply and Sanitation Company
LWSC	Lusaka Water Supply and Sanitation Company
MCDR	Mineral Conservation and Development Rules
MSD	Mines Safety Department
MMDA	Mines and Minerals Development Act
MMMD	Ministry of Mines and Minerals Development
MoC	Ministry of Coal
MoLE	Union Ministry of Labour and Employment
MWSC	Mulonga Water Supply and Sanitation Company
NASREC	Applied Sciences Research Ethics Committee
NCS	National Conservation Strategy
NEAP	National Environmental Action Plan
NPE	National Policy on the Environment

SHEQ	Safety Health and Environmental Quality
TD	Tailings Dam
ToR	Terms of Referenc
UPB	Unconditional Performance Bond
UNZA	The University of Zambia
WDC	Ward Development Committees
ZCCM	Zambia Consolidated Copper Mines
ZCCM - IH	ZCCM – Investment Holdings
ZEMA	Zambia Environmental Management Agency

CHAPTER ONE: INTRODUCTION

1.1 Background

The mining sector is a major contributor to Zambia's economic growth. Zambia has a long mining history spanning over 90 years and in the late 1960s, Zambia held a position of the World's third largest copper producer. The Government of the Republic of Zambia gained control of the copper mines shortly after independence and created the state-owned enterprise Zambia Consolidated Copper Mines (ZCCM) in 1982. As a result of dropping copper prices and under investment which led to a steady slump of copper production from 750,000 tonnes in 1960s to 250,000 tonnes in the year 2000 (Figure 1), the government decided to implement a comprehensive restructuring program aimed at promoting private sector-led development in order to boost and make the mining sector viable. Privatization of the mines was completed in the year 2000 with ZCCM assets being sold to private investors and ZCCM was transformed into an investment holding company, ZCCM – Investment Holdings (ZCCM-IH). ZCCM's privatization was expected to mark a turning point in Zambia's economic reform process, providing the basis for reinvestment in the sector and sustainable employment, improved environmental management, economic sustainability and growth.

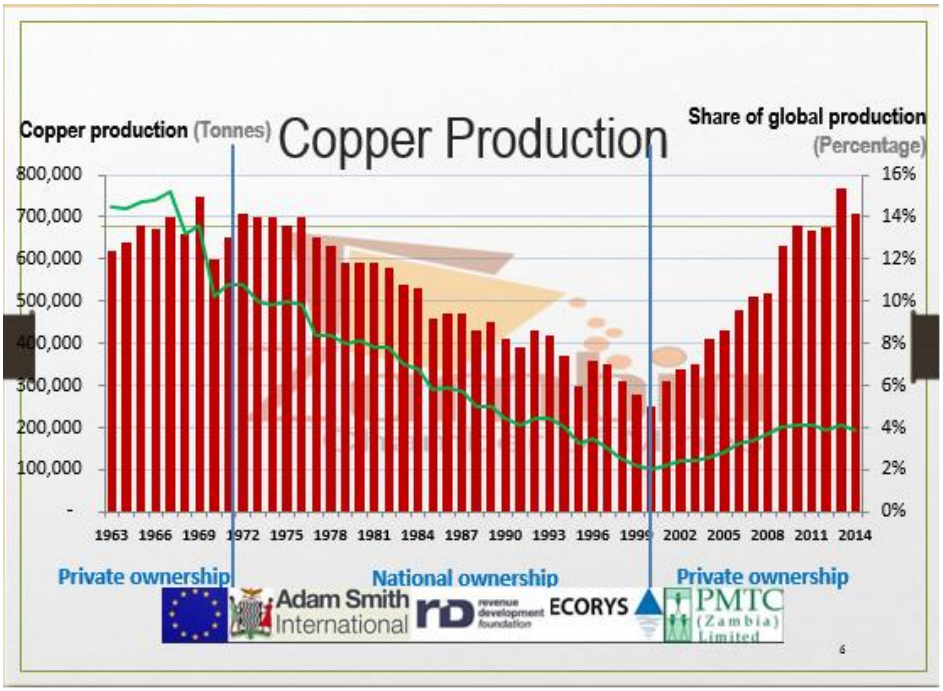

Figure 1: Zambia's Copper Production - Nationalization vs Privatisation

(Source: Presentation by Chief Mining Engineer of the Ministry of Mines during AZMEC 2020)

As part of the privatization process, the government made strategic choice to retain responsibility for a wide range of environmental liabilities that had accrued from over 70 years of mining activity, and ZCCM and subsequently ZCCM-IH was burdened with the responsibility to house these large environmental liabilities (World Bank, 2016). Following privatization and partly due to the significant increases in commodity prices in the ten years leading up to 2011, and in line the Mines and Minerals Development Act (MMDA) of 2008, ZCCM-IH succeeded in passing ownership of unused tailings dam (TD) onto new private investors, who saw potential commercial value in them (World Bank, 2016).

The high potential for continued mining combined with policy and institution capacity weaknesses poses a serious risk. Many mining companies are not compliant with the requirements of the Environmental Protection Fund (EPF), which is the current financial surety mechanism to ensure funding is in place to close mines if a company fails to restore the environment. Concurrent rehabilitation of mining sites is also generally not taking place – partly because some investors are hopeful that the low concentrations of metal that remain in TDs could be economically feasible in future as a result of improved commodity prices and evolvement of technology. Licence holders want to maximize the option value associated with the TDs in the future and since there is little cost to an investor to hold a mining license, and probably since enforcement of environmental regulation is weak, the license holders indefinitely defer remediation of old TDs and mining sites (Ministry of Mines and Minerals Development, 2020).

From the policy perspective, government has been active, but with a primary focus on revenue generation. An Environmental Protection Fund (EPF) (Special Instrument No. 102) was incorporated in the Mines and Minerals (environmental) Regulations 1998. The EPF, which was operationalized under the Copperbelt Environment Project (CEP), was intended to ensure mine developers execute their environmental impact statement and mine closure plans accordingly before a closure certificate was issued by MSD, and assure that funds for the rehabilitation of mining areas are available if the holder of the mining licence fails to rehabilitate the area. In an effort to rebalance the distribution of benefits from the mining following privatization, a new feature was introduced through the Mines and Minerals Development Act (MMDA) No. 7 of

2008: The removal of the Development Agreements that underpinned the mining fiscal benefits continued as commodity prices increased through several changes to the mining fiscal regime through to 2016 (World Bank, 2016). The MMDA No. 7 of 2008 was replaced by MMDA No.15 of 2015, whose features among others include the introduction of honorary inspectors to strengthen the enforcement of the Act and its subsidiary regulations. As the above summary highlights, much of the focus on mining in Zambia has been on its revenue generating potential. This has been reinforced by donor support focusing on tax collection both with respect to policy and administration, with few large projects addressing the environment, health and public safety issues related to the mining sector.

In view of the foregoing issues highlighted, the research sought to analyse the extent to which environmental stewardship is applied in the mining sector by the Government of the Republic of Zambia. Further, recommendations have be made in order to bridge the existing gaps in the legislation as well as implementation procedures. The research began by examining legislation governing the environment in the mining sectors of renowned jurisdictions, detailed analysis of the Zambian law with comparative states (states that are embracing good practice in management of environment). Further the research highlighted some existing weaknesses under the Zambian law. Finally, the research analysed the final findings and made recommendations.

1.2 Statement of the Problem

The mining sector is a major contributor to Zambia's economic growth making up over 70 percent of the country's export earnings. In the late 1960s at the peak of production, Zambia held the position of being the World's third largest copper producer. However, a long history of mining has left a legacy of environmental liabilities such as Sulphur dioxide in Kankoyo township of Mufulira District, tailing dams and overburden dumbs dotted around the towns of the Copperbelt province which are silting the streams and public health risks associated with heavy metal (such as Lead) contamination in the soil especially in Kabwe District as shown in figure 2. Until 1990s, the Zambian legislation on environmental stewardship was weak.

Figure 2: Legacy Environmental Liability Facilities (Source: Author 2021)

Despite not being adequate and efficient, National Environmental and Social Safeguards structures exist in Zambia through existing development frameworks, environmental policies, legislation and regulation, specifically:

i) Zambia Vision 2030 with a target of having a sustainable social economic mining sector developed, with reduced environmental degradation from mining activities by 75 percent.

ii) The Eighth National Development Plan (8NDP) which has adopted environmental sustainability as one of the four key strategic areas. During its implementation the focus will be on reversing unsustainable environmental and natural resources management practice with the view of promoting integrated environmental management. Prior to 8NDP, there was a Sixth National Development Plan (6NDP) which adopted a strategy of

mitigating environmental impact of mining through the development of relevant regulations and environmental impact mitigation training.

iii) The National Policy on the Environment: A principal policy that coordinates environmental management in Zambia.

iv) The Environmental Management Act: Principle Act in environmental management.

v) The Environmental Impact Assessment Regulations: Regulates the development of either an Environmental Impact Assessment or Environmental Project Brief depending on the anticipated scale of impacts the project could have on the environment.

Despite the existence of several policy pronouncements and support legislative instruments there seems to still be high prevalence of non-compliance and adherence to sound environmental practices by various players in the mining industry (Figure 3). It is therefore concerning why this state of affairs continues taking into account the existence of many legislative and regulatory instruments and tools to effectively govern the sector. It is clear that the efficacy (effectiveness) of existing environmental laws in Zambian mining sector have not been investigated to maybe better design the required intervention measures.

Figure 3: Current Environmental Pollution in Kabwe District **(Source: Author 2021)**

1.3 Research Objectives

1.3.1 General Objective

The general objective of the research is to analyze the efficacy of environmental laws in Zambia's mining sector.

1.3.2 Specific Objectives

i) To analyze the extent to which environmental laws are applied in the mining sector;

ii) Assess the capacity of the institutions responsible for the implementation of the existing environmental legislation in the mining sector and its enforcement procedures;

iii) Identify the weaknesses and gaps existing in the current legislation; and

iv) Make recommendations based on the best practice in the World to strengthen and/or fill up the gaps – through comparative studies with some of renowned Countries in the area of proper environmental management. In this case the selected countries are Australia and India.

1.4 Research Question

i) To what extent are environmental stewardships applied in the Mining sector in Zambia?

ii) What is the capacity and enforcement procedures of the institutions responsible for the implementation of the existing environmental laws in the Mining Sector?

iii) What weaknesses or gaps exist in the current environmental legislation? and

iv) What recommendations based on best environmental practice could be made and adopted in order to strengthen legislation and institution capacity to regulate the mining sector so as to avoid future environmental liabilities by the Government of the Republic of Zambia?

1.5 Significance of Study

For a number of years to come, mining is expected to continue to be important for Zambia (Ministry of Mines and Minerals Developent, 2017) and unless serious measures are put in place, the past is likely to repeat itself (in terms of damage to the environment). Zambia has a long history of mining, a large known resource base of copper and other deposits, and good potential for further discoveries especially in the North Western province of Zambia. Although copper production in Zambia is generally high cost compared to other countries, the overall economic environment is generally favourable and the overall political environment is satisfactory making Zambia an attractive mining location (Ministry of Mines and Minerals Development, 2014).

This provides a good basis for further positive contribution from the mining sector to the Zambian economy. However, unless the existing system of mining-environmental governance changes, the environmental, social and human health impacts associated with mining will continue to increase.

The study was able to analyse the extent to which environmental laws are applied in the mining sector, identified weaknesses or gaps existing in the law and finally made recommendations based on research findings and international best practice to bridge the gaps.

1.6 Scope of the Study

Mining in Zambia is identified as one of the activities which adversely affects the environment by inducing inter alia loss of biodiversity, soil erosion, high potential contamination of surface and ground, loss of social amenities.

The research focused on evaluating the extent to which environmental and social safeguards in the mining sector are applied in Zambia. That was done by considering the existing environmental and mining policies as well as corresponding legislation, enforcement procedures and the capacity of institutions responsible. Comparative studies with the jurisdictions of the Republic of India and Australia was also conducted in that regard with the view of drawing good practices which were then recommended fill up existing gaps, strengthen weaknesses and inefficiencies of the current legislation, and address the deficiencies in the implementation structures.

1.7 Limitation of the Study

Mining Operations are identified as the major contributor to adverse environmental and social impact degradation. Due lack of resources to travel to Australia and India, data collection for a case study was done through desktop reviews. The selection of the jurisdictions of Australia and India for the case studies conducted was based on how easy it was to access information about the two countries.

Further, data collection proved to be a challenge in other institutions such as Kitwe City Council, Mufulira Municipal council and also some water utility companies. All these were formally written to and follow ups made using phone calls but to no avail.

1.8 Ethical Consideration

Ethical considerations was taken into account by ensuring that relevant permission to undertake the study was obtained as most of the data/information came from government departments, agencies, municipalities, water utility companies and communities etc. Ethical clearance was

applied for and granted by Natural and Applied Sciences Research Ethics Committee on December 7, 2021 for a period of one year as shown in Appendix 1.

1.9 Chapter Summary

This chapter helped the researcher to understand the importance of the mining sector in Zambia and that it is major contributor to the national economy. In 1990s, the government developed a number of environmental regulations as shown in chapter 2 which among others included the Environmental Protection Fund (EPF) as the only possible surety for environmental liabilities. Despite the efforts the government put in place in developing environmental legislation, pollution from mining and mineral processing proponents has continued as shown in figure 3. It was therefore, important that a research to analyse the efficacy of the existing environmental legislation in Zambia's mining sector was conducted.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

In the previous chapter, the need to carry out a research to focus on the efficacy of existing environmental laws and their respective institutions responsible for enforcement due to the continued pollution from the mining and mineral processing plants was established. This chapter therefore, discusses subsisting environmental legislation applicable in the mining sector of the two jurisdictions identified for purposes of making a comparative study with Zambia. The two jurisdictions are Australia and India. The selection of Australia and India to the exclusion of others does not mean they have the best practice in the World. The selection of these two countries was based on how easy it was to access information about their jurisdiction. The chapter also endeavors to expound existing implementation structures in these comparative countries. During the study, the following literature was reviewed:

i) National Environmental Policy and associated Acts of parliament and regulations;
ii) Principal and Complementary pieces of environmental as well as mining legislations governing the mining sector in Zambia;
iii) Legislation regulating the environment in the mining sector of the two comparative jurisdictions – India and Australia; and
iv) Books, journal, conferences, treaties and conventions on best mining and environmental practice (both local and international.

2.2 The Zambian Mining Sector: An Overview

The high potential for continued mining (Ministry of Mines and Minerals Development, 2013) combined with policy and capacity weaknesses pose a serious risk to the environment.

The literature reviewed demonstrated that the mining sector has been a major contributor to Zambia's economic growth (Zambia Environmental Management Agency, 2017). Copper and Cobalt production (Ministry of Mines and Minerals Development, 2015, 2016) has been the backbone of the country's economy and historically, the performance of the Zambian economy has closely followed the fortunes of copper mining. As a mineral rich nation, Zambia has benefited from the unprecedented increases in commodity prices over the past decades and the surge in international merger and acquisitions, along with large foreign direct investment (FDI) flows, mainly in extractive industries but also in the services sector. Zambia's mining sector has

benefited from FDI, receiving almost US$1 billion in 2011 alone subsequently accumulated to US$5 billion in 2013 (Ministry of Mines and Minerals Development, 2013).

2.3 Environmental Liabilities

A long history of mining has left a legacy of environmental liabilities in mining towns. Seventy years of mining operations, no formal mine closure has been conducted, and lack of concurrent rehabilitation of mining sites has resulted in a massive environmental mortgage (World Bank, 2016). At the time of privatization, commodity prices were still low and private investors were unwilling to accept legal responsibility for such historical environmental liabilities, given both the extent, seriousness and, in some instances, unquantifiable nature of the mining related environmental and public health liabilities. Due in part to lack of detailed environmental and social baseline study for each mine site at the time of privatization, the old (pre-privatization and new (post-privatization) environmental liabilities are now often inseparable, particularly where extent beyond the boundaries of mining licences. With regards to the TDs that contain low content of metal, many of the new owners have been waiting for increased prices to make them economically feasible and so postponed final reclamation of the sites. Due to fluctuating copper prices and low content in the tailings, none of the new owners have started reprocessing tailings, resulting in ongoing environmental health liabilities and exposures to local communities. Many of the liabilities and risks have now increased due to natural deterioration or poor and/or lack of enforcement of environmental standards. The public health risks fall disproportionately on the poor and the vulnerable population, in particular on the children, who are continually exposed to toxic pollution and live in poor, degraded and abandoned mining areas, with limited access to proper diagnostics, care and treatment.

The potential for the mining sector to remain as a prime mover of Zambia's economy still remains attractive. The country has in the recent past recorded mineral diversification, moving away from the traditional mining of copper and cobalt to manganese, gemstones and gold (Ministry of Mines and Minerals Development, 2017). The unsound and uncontrolled exploitation of these new minerals, especially gold in areas such as Petauke, Rufunsa, Vubwi, Luano and Mwinilunga districts have continued to pose danger to the environment as shown in figure 4 where gold panning activities are silting (drying up) streams and depositing mercury and cyanide into the environment.

Figure 4: Illegal Mining Activities in Kabwe and Petauke **(Source: Author)**

Despite being an investment attracting, the mining sector has suffered from environmental legacy issues relating to historical public sector monopoly and a contentious privatization process. The government of the Republic of Zambia has at different occasions obtained loans (the latest one currently being implemented is Zambia Mining and Environmental Remediation and Improvement Project - ZMERIP) aimed at attempting to clean up the environmental legacy ranging from lead pollution, old tailings dam (TDs), overburden rocks (OBs) and effects of Sulphur dioxide emissions (examples of TDs run-off material silting the streams, and windblown

particulate matter affecting the surrounding communities and Sulphur dioxide especially in Kankoyo Township where soil fertility is affected. Facilities such as TDs and OBs, and some mining companies have continued to pollute the environment more especially during the rainy season.

2.3.1 Applicable Environmental Policy and Law in the Mining Sector

There exist environmental legislation (these include inter alia EIA Regulations of 1997, Environmental Management Act No. 12 of 2011 and Mines and Minerals Development Act 2015) in Zambia (Zambia, 1997, 2011, 2015) which regulates the environment and requires that for any project to be developed, either an environmental impact statement (EIS) or an environmental project brief (EPB) is prepared by the developer and reviewed by ZEMA with support from relevant stakeholders before a decision letter is issued to commence operations. An EIS is meant to guide the developer to identify likely adverse environmental impact as a result of the project implementation and corresponding mitigation measures. ZEMA and MSD have a primary responsibility to monitor implementation of the Environmental management plans both before, during and after project implementation. The law places the responsibility on the developer (polluter pays principle as provided for in Section 6 of the Environmental Management Act No. 12 of 2011) to make it safe.

However, a long history of mining has left a legacy of environmental liabilities and public health risks especially in the mining towns of the Copperbelt province and Kabwe district. Until 1990s, the Zambian legislation on environmental stewardship was weak much emphasis was on production of primary copper, cobalt and zinc. Despite not being adequate and efficient, National Environmental and Social Safeguards structures exist in Zambia through existing development frameworks, environmental policies, legislation and regulation. These included the following:

i) **Zambia Vision 2030** with a target of having a sustainable social economic mining sector developed, with reduced environmental degradation from mining activities by 75 percent.

ii) **The Eighth National Development Plan (8NDP)** which has adopted environmental sustainability as one of the four key strategic areas. During its implementation the focus will be on reversing unsustainable environmental and natural resources management practice with

the view of promoting integrated environmental management. Prior to 8NDP, there was a Sixth National Development Plan (6NDP) which adopted a strategy of mitigating environmental impact of mining through the development of relevant regulations and environmental impact mitigation training.

iii) **The National Policy on the Environment (NPE) 2007**: A principal policy that coordinates environmental management in Zambia. The NPE was designed to create a comprehensive framework for effective natural resource utilization and environmental conservation which would be sensitive to the demands of sustainable development and with the objectives of:

a) Promoting the sound protection and management of Zambia's environment and natural resources in their entirety, balancing the needs for social and economic development and environmental integrity to the maximum extent possible, while keeping adverse activities to the minimum;

b) Managing the environment by linking together the activities, interests and perspectives of all groups, including the people, nongovernmental organizations (NGOs) and government at both the central and decentralized local levels;

c) Accelerating environmentally and economically sustainable growth in order to improve the health, sustainable livelihoods, income and living conditions of the poor majority with greater equity and self-reliance;

d) Ensuring broadly-based environmental awareness and commitment to enforce environmental laws and to the promotion of environmental accountability; Building individual and institutional capacity to sustain the environment;

e) Regulating and enforcing environmental laws; and

f) Promoting the development of sustainable industrial and commercial processes having full regard for environmental integrity.

iv) **National Environmental Action Plan**: The focus of the National Environmental Action Plan (NEAP) of 1994 was to identify environmental problems and issues, analyse their causes, and recommend necessary interventions. The NEAP was prepared as a comprehensive plan to contain the ever increasing environmental degradation in Zambia. The preparation of

NEAP was as a result of the Government of the Republic of Zambia's desire to update the National Conservation Strategy (NCS) due to inter alia the fact that the economy was undergoing a period of liberalization, the technical information in the NCS needed updating and the requirement by World Bank for a NEAP as a prerequisite for International Development Association (IDA) loan funding. The NEAP was founded on three fundamental principles:

a) The right of citizens to a clean and healthy environment;

b) Local community and private sector participation in natural resources management; and

c) Obligatory EIA of major development projects in all sectors.

By and large, the overall objective of the NEAP was to integrate environmental concerns into Zambia's social and economic development planning process.

v) **The Environmental Management Act, 2011**: This is apparently the principal Act in the management of the environment and it is also the Act upon which ZEMA was created. The relevance of the Act included monitoring and enforcement of environmental regulations, execution and monitoring of Environmental and Social Impact Assessment procedures, licensing of generation, transportation, storage and disposal of wastewater, coordinating and advisory roles related to environmental management, and raising public awareness on environment.

The aim of the Environmental Management Act, 2011 is to:

a) Ensure continued existence of the Environmental Council of Zambia (ECZ) and re-name it as the ZEMA;

b) Provide for integrated environmental management and the protection and conservation of the environment and the sustainable management and use of natural resources;

c) Provide for the preparation of the State of the Environment Report, environmental management strategies and other plans for environmental management and sustainable development;

d) Provide for the conduct of strategic environmental assessments of proposed policies, plans and programmes likely to have an impact on environmental management;

e) Provide for the prevention and control of pollution and environmental degradation;

f) Provide for public participation in environmental decision making and access to environmental information;

g) Establish the Environment Fund;

h) Provide for environmental audit and monitoring;

i) Facilitate the implementation of international environmental agreements and conventions to which Zambia is a party; and

j) Repeal and replace the Environmental Protection and Pollution Control (EPPC) Act, 1990 whose main focus was to control pollution and protect the environment for present and future generations. This was a robust piece of legislation for its time as it contained issues that were pertinent at the time. Due to global emerging environmental issues, it became apparent that the EPPCA had become obsolete both in terms of environmental issues covered and also in the enforcement measures provided in the Act, It therefore became imperative that the old Act had to be replaced with a relevant legislative framework.

vi) **Mines and Minerals Development Act No. 11 of 2015**: This is the principal law in the management of minerals during exploration, mining and processing. It also provides for the safety, health and environmental protection in mining operations. The Act is currently under review.

vii) **Other Relevant Laws**

There also exists Environmental Regulations for: air pollution; hazardous waste management; ozone depleting substances; pesticides and toxic substances; and waste management. These are supported by a cascade of relevant sector policies, legislation and regulation including, inter alia, agriculture, fisheries, forestry, inland waters, lands, mining, roads, water and wildlife, that include provisions for minimizing or preventing negative impacts and enhancing delegated community roles in resources management.

Table 1 summarises additional key policies/legislations reviewed during the research and their respective rationale/objectives.

Table 1: Summaries of Legislation with Corresponding Rationale

	POLICY/ LEGISLATION	RATIONALE/OBJECTIVES
1.	Constitution of Zambia (Amendment) Act, 2016, Part XIX, Articles 256 – 257	Provides for principles of environmental and natural resources, management, and development (Polluter pays principle); protection of environment and natural resources; and utilization of natural resources and management of environment.
2.	National Conservation Strategy (NCS) - 1985	To redress the imbalance between development and environment
3.	CAP 204, Environmental Protection and Pollution Control act	The main focus of the Act was to control pollution and protect the environment for present and future generations
4.	National Policy on Environment(NPE) 2007	Aimed and promoting sustainable social and economic development through sound management of environment and natural resources.
5.	National Environmental Action Plan (NEAP)-1994	The focus of the National Environmental Action Plan (NEAP) of 1994 was to identify environmental problems and issues, analyse their causes, and recommend necessary interventions. The preparation of NEAP was as a result of the Government of the Republic of Zambia's desire to update the NCS due to inter alia the fact that the economy was undergoing a period of liberalization, the main NCS recommendations had been implemented and the technical information in the NCS needed updating.
6.	The Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations, 1997 – SI No. 28 of 1997	Provided for the guidelines and development of an environmental impact assessment before a developer implements a project which would require either an environmental project brief (EPB) or an environmental impact statement depending on the schedule the project belongs
7.	Environmental Management Act, 2011	- An Act to continue the existence of the Environmental Council and re-name it as ZEMA - Provide for integrated environmental management and the protection and conservation of the environment - The sustainable management and use of natural resources - Provide for the prevention and control of pollution and environmental degradation Provide for Public Participation (PP) in environmental decision-making
8.	Mines and Minerals (Environmental) Regulations – SI No. 29 of 1997	Provides for preparation of environmental impact assessment including mine closure

Table 1 Continues

	POLICY/ LEGISLATION	RATIONALE/OBJECTIVES
8.	Mining Policy/Mineral Resources Development Policy - 2013	Among others to achieve a socially and internationally acceptable balance between mining and the bio-physical environment and ensure that acceptable standards of health, safety and environmental protection are observed by all participants in the mining sector
9.	Mines and Minerals Development Act 11 of 2015	Principal Act in the regulating all mining activities in Zambia. Provides for inter alia the safety, health and environmental protection in mining operations.
10.	Mines and Minerals Act (Environmental) Regulations, 1997, Mines and Minerals (Environment Protection Fund) Regulations, 1998	Provides for the Financial assurances and sureties for environmental protection for mines and mineral processing units and allied activities (such as explosive manufacturing) are to be deposited in the environment protection fund in the manner prescribed in Part VIII of The Mines and Minerals Act (Environmental) Regulations, 1997 and managed as per the Mines and Minerals (Environment Protection Fund) Regulations, 1998
11.	Solid Waste Regulation and Management Act No. 20 of 2018	An Act to provide for the sustainable regulation and management of solid waste; general and self-service solid waste services; the licensing and functions of solid waste service providers, operators and self-service solid waste providers and provides for their functions; the regulations, operation, maintenance and construction of landfills and other disposal facilities among others

(Source: Author)

2.3.2 Environmental Governance and Institutional Arrangement in the Sector

Environmental management in general in the Republic of Zambia is principally governed by the Environmental Management Act No. 12 of 2011 being enforced by ZEMA. Meanwhile, all the mining operations are regulated principally by the Mines and Minerals development Act No. 11 of 2015 with its associated regulations enforceable by the Ministry of Mines and Minerals Development. The institutional implementation arrangements for the enforcement of environmental legislation in Zambia's mining sector are as follows:

i) Zambia Environmental Management Agency (ZEMA)

ZEMA is a statutory body created under the Environmental Management Act No. 12 of 2011. It is the principal environmental regulatory body in Zambia. ZEMAs' overall mandate is to provide

for integrated environmental management and the protection and conservation of the environment and the sustainable management and use of natural resources. ZEMA is governed by a board that provides strategic direction, develops policies, approves its work plans and budget, as well as for monitoring its functions.

The functions of ZEMA include inter alia advising government and the private sector on aspects of environmental management, coordinating the implementation of activities of all ministries and other authorities in matters relating to the environment, developing and enforcing measures aimed at preventing and controlling pollution, develop standards and guidelines relating to the protection of the environment, initiate, conduct and promote research, surveys, studies, training and investigations in environmental management, undertake general educational programmes for the purpose of creating public awareness on the environment, review environmental impact assessment reports and strategic environmental assessment reports and also to monitor trends of natural resources, their use and impact on the environment and make necessary recommendations to the appropriate authority (Parliament of Zambia, 2011).

a) Operation of ZEMA

In order to increase transparency and accountability during development process and consequently reduce environmental damage, ZEMA ensures that before any project is implemented, an EIS/EIA report is prepared by the developer and submitted to ZEMA for approval. This is to ensure that potentially negative impacts are foreseen and addressed at an early stage in the project development process, appropriate participation of government, affected and interested parties in the decision making process and development activities are people centered and contribute to local economies. The preparation of the Environmental Impact Assessment as guided in the Second Schedule. The Environmental Management Act (2011) of the Laws of Zambia read together with Statutory Instrument No. 28 of 1997 provides for Environmental Impact Assessment regulations that classify projects into either the First Schedule or Second Schedule depending on the size, nature and anticipated environmental consequences of a project.

b) Process of Issuing a Decision Letter

The procedure for obtaining environmental clearance from ZEMA for any project is outlined below:

- An environment clearance has to be obtained from ZEMA for every project (in this case mine) irrespective of its size, type of minerals or location. The environmental clearance is issued in the form of a decision Letter with an annexure containing the Environmental Management Plan compliance conditions; and
- There are two categories of projects (including mines) as provided for under the Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations of 1997. The categories are either first schedule or second schedule depending on the magnitude of the environmental and social impacts the project might have.

If the project fell in the First Schedule, it would require preparation of a project brief and submission of the same in requisite copies to the ZEMA. ZEMA sends copies within seven days to various authorizing agencies (including MSD, in case of mineral processing or mining projects) and stakeholders for feedback that is required within 30 days. On lapse of the specified feedback period, the project is considered approved by ZEMA with the feedback, if received. ZEMA can approve the Project brief, reject it, or defer it for further revision. In either of the former two cases, a decision letter is issued. However, if the project falls in the Second Schedule, the developer has to conduct a scoping consultation at site with various stakeholders and prepare terms of reference (ToR), which are submitted to ZEMA. The ToR, at this stage are accompanied by a list and curriculum vitae (CVs) of persons who will make the environment impact statement (EIS) team. ZEMA then reviews the ToR and competency of the proposed EIS team and gives approval for the same or directs revision. Once the ToR and the EIS experts are approved, the developer has to undertake a disclosure consultation with stakeholders at the project site. The EIS is then prepared and submitted to ZEMA.

At this stage, ZEMA may opt to conduct a public hearing, if it deems it necessary in view of the scale and impact of the project. Within seven days of receiving EIS, ZEMA has to send copies to various authorizing agencies (including MSD, in case of mines) and stakeholders for feedback, which is required within 30 days. On lapse of the specified feedback period, the project is

considered by ZEMA along with the feedback, if received. In case of sensitive projects, ZEMA may wait longer for feedback from stakeholders. It could approve the EIS, reject it or defer it for further revision.

For purposes of monitoring during project implementation and operations, post-assessment environmental audit must be carried out by the project within a period not less than 12 months and not exceeding 36 months after the completion of the project or commencement of its operation, whichever is earlier. It must be carried out by at least two of the appropriately qualified persons from the EIS team, and if not possible, by persons whose names and qualifications have been approved by ZEMA for the purpose ZEMA may require the developer to carry out specified remedial actions and further audits at such times as it considers necessary. It is learned that although the frequency and processes are not documented, inspections for checking EMP compliances are carried out twice a year while audits are carried out once a year.

The ten (10) stages involved in conducting a full ESIA are summerised in figure 5 below:

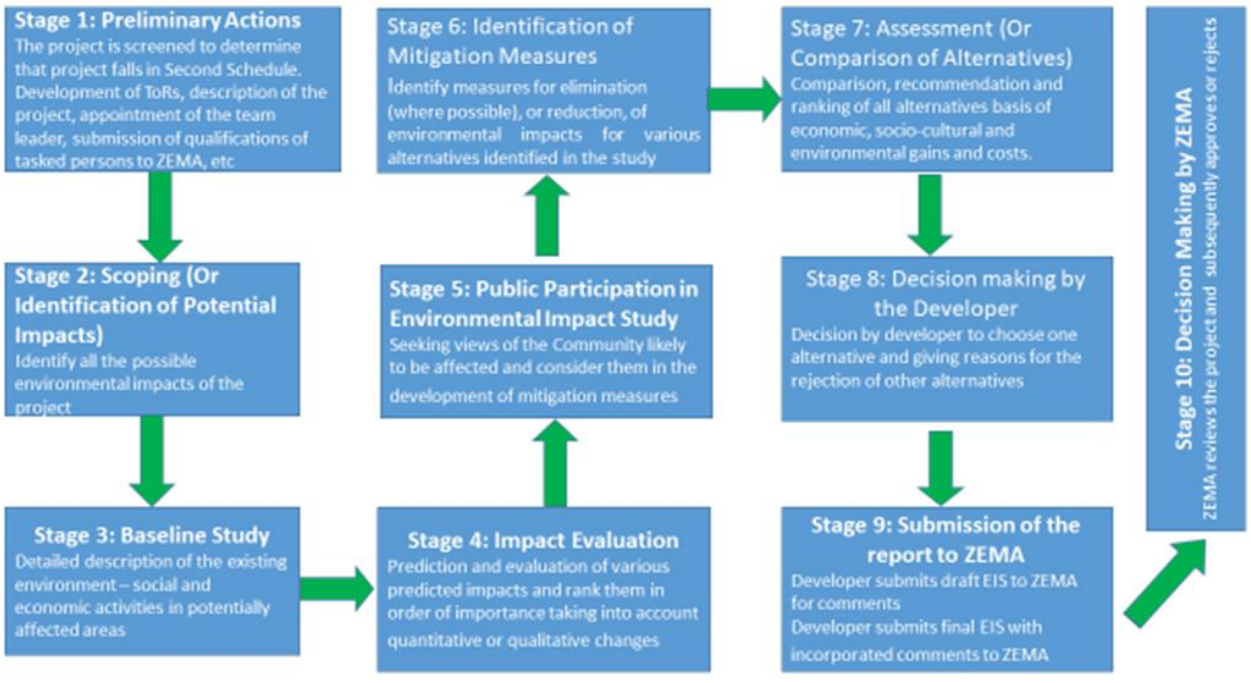

Figure 5: Flow Diagram Showing Stages in conducting a full EIA

(Source: EIA Regulation, 1997)

ii) **Mines Safety Department (MSD)**

The Mines Safety Department is one of the technical department under the Ministry of Mines and Minerals Development (MMMD). MSD is responsible for all matters pertaining to the safety and health of persons employed in exploration, mining and mineral processing operations throughout the Republic under the provision of Mines and Minerals Development Act No.11 of 2015. It is also responsible for all matters encompassing safety of manufacture, possession, storage, transportation, use, destruction, exportation and importation of all civil explosives in Zambia under the provisions of the Explosives Act No.10 of 1974. The Director of Mines Safety also has the additional responsibility of protecting the environment and controlling pollution in the areas where exploration, mining and mineral processing operations are being carried out as provided for in Section 5 (4) of the Mines and Minerals Development Act No.11 of 2015.

The department (MSD) is also responsible for the formulation and enforcement of occupational health and safety standards as well as the promotion of effective environmental management programmes and the prevention of wasteful practices in the mining industry as required by the Mines and Minerals Act and the Explosives Act together with their subsidiary legislation. The directorate is made up of four units and these are Machinery Unit, Mining Unit, Explosives Unit, and Environment and Research Unit. The department is located in Kitwe District of the Copperbelt province of Zambia.

MMMD has a very key role in safeguarding and protecting the environment at licencing stage ensuring that there are acceptable environmental management plans (EMPs) in place before granting of any of the mining rights including a mineral processing licence for proposed project. Further, Ministry of Mines and Minerals Development through MSD takes an active role during the preparation of the safeguard documents by the developers before a decision letter is granted by ZEMA. Director of MSD sits on the Zambia Environmental Management Agency board, an authority mandated to issue decision letters (Stage number 10 as indicated in figure 5).

2.4 Environmental Legislation Applicable in Jurisdictions of Australia and India

This section discusses subsisting environmental legislation applicable in the mining sector of the selected two jurisdictions identified for purposes of making a comparative study with Zambia. The two jurisdictions are Australia and India. The selection of Australia and India to the

exclusion of others does not mean they have the best practice in the World. The selection of these two countries was based on how easy it was to access information about them.

2.4.1 Australia

Australia is one of the leading countries in the mining and resource space, with vast reserves of copper, gold, iron ore, lead, rare earth elements, and other minerals. Just like Zambia, the sector is a key component of the country's economy, comprising six percent of its GDP in financial year 2017-18 as produced by Australian Tax Office.

The province of Western Australian is the key contributor to the nation's resources sector, accounting for approximately 52 percent share of the country's minerals and petroleum output. Hence, of the overall minerals and petroleum sector's output of $170 billion in the year, the province accounted for $90 billion, with $66 billion comprising minerals and the rest petroleum. The province also contributed approximately 69 percent share of the total mineral and energy exports of the country (Department of Mines, Industry Regulation and Safety, 2018/19).

Within mineral and petroleum, iron ore was the key commodity in Western Australia, accounting for 54 percent of the state's mineral and petroleum industry's sales in 2018-19. The petroleum sector, consisting of oil and gas, was second with 23 percent share of the overall value. The third most important commodity in the province was gold, at 10 percent of the overall value, followed by alumina, base metals (copper, lead and zinc), nickel, and tin-tantalum-lithium, each achieving a value in excess of $500 million. Other major commodities included diamonds, cobalt, coal, mineral sands, rare earth metals, and salt ((Department of Mines, Industry Regulation and Safety, 2018/19) – Australia).

The mining industry is also a key employer in the province, employing approximately 124,000 people in 2018–19, up from 112,000 in the previous year. This included those employed in mine site infrastructure construction, mineral processing, mine site surveying, transporting and catering, that is, those operating on-site. The mineral exploration activities segment employed a further 3,086 people during the year ((Department of Mines, Industry Regulation and Safety, 2018/19) – Australia).

Although mining activities in Australia dates back to the 1880s, formal legislations were placed in the 1980s for effective management of the mineral and resource sector.

2.4.2 Applicable Environmental Legislation

From the time that mining began, there has been changes in laws and regulations in Australia in the mining, environment and social sectors derived from the federal government's National Resources Statement , which outlines its policy approach and five-point reform agenda for the resources sector. The mining sector in Western Australian is governed by several legislations. Currently, policy and legal instruments available in the province and applicable with respect to the mining sector include but not limited to the following Environmental Protection Authority (EPA):

i) Environmental Protection (Peel Inlet - Harvey Estuary) Policy 1992: It is to mainly address the total flow of phosphorus through waterways into estuary causing nutrient enrichment, stimulating excessive growth of algae, creating serious public nuisance, and degradation of the estuary. It is important to note that, case-specific mine closure and environmental risk are significant in the absence of compliance.

ii) Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999. This piece of legislation was developed to provide for ambient air quality standards and ambient air quality limits for the concentration of atmospheric wastes in the relevant portion of the environment; and also to establish a program that may be used to control the discharge of atmospheric wastes from industrial sources so that those ambient air quality standards and ambient air quality limits can, respectively, be achieved and complied with.

iii) Environmental Protection (Goldfields Residential Areas) (Sulfur Dioxide) Policy and Regulations 2003. The purpose of this legislation was to control and progressively reduce the sulfur dioxide concentration in the ambient air of a protected area each year until 2008; and to ensure that during and after 2008, the sulfur dioxide concentration in the ambient air of a protected area did not exceed 0.25 ppm.

iv) Environmental Protection (Western Swamp Tortoise Habitat) Policy 2011. The purpose of this policy was to protect habitat suitable for the long-term survival of the wild population of the western swamp tortoise.

v) Environmental Objectives Policy for Mining - March 2020. The objectives of this policy are to clearly identify the environmental objectives of regulation under the Mining Act 1978,

inform the development of site-specific environmental outcomes, and provide to the industry and the community the Department of Mines, Industry Regulation and Safety's (DMIRS) expectations relating to environmental acceptability of proposals. Mining activities to be rehabilitated and closed in a manner to make them physically safe to humans and animals, geo-technically stable, geo-chemically non-polluting/non-contaminating, and capable of sustaining an agreed post-mining land use, and without unacceptable liability to the state.

vi) The Environmental Protection Act 1986. To protect the environment of the state, having regard to the principles which included the precautionary principle, the principle of intergenerational equity, the principle of the conservation of biological diversity and ecological integrity, principles relating to improved valuation, pricing and incentive mechanisms and the principle of waste minimization.

vii) Environment Protection and Biodiversity Conservation (EPBC) Act 1999 (Commonwealth) (as on August 2019). It is the Australian government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places defined in the EPBC Act as matters of national environmental significance. The provisions of this Act have been mostly addressed under respective states' legislation. Some of the provisions may be the preconditions of mining tenements and, hence, have to be addressed in mine closure plan (which is submitted with application for mining lease), if applicable.

viii) The Mining Rehabilitation Fund Act 2012 (As at 30 Jun 2014). The Act was established to provide for the Mining Rehabilitation Fund; the declaration of abandoned mine sites; a levy payable with respect of mining authorizations and for related purposes. Basically it establishes a fund, payment, calculation of payments, reporting requirements, non-compliance.

ix) Contaminated Sites Act (2003). An Act provides for identification, recording, management and remediation of contaminated sites, to consequentially amend certain other Acts and for related purposes. This Act provided for remediation of contaminated sites. The definition of contaminated site as per the Act is: "Contaminated, in relation to land, water or a site, means having a substance present in or on that land, water or site at above background

concentrations that presents, or has the potential to present, a risk of harm to human health, the environment or any environmental value." By interpretation of the definition, the governance of abandoned mines (past and future) and other contaminated site due to mining activities will fall under the purview of this Act.

x) Environmental Protection (Clearing of Native Vegetation) Regulations 2004. Regulate clearing of native vegetation, including those planted for the purpose of biodiversity, conservation, or land conservation. Conditions for permitting low impact, or other mineral or petroleum activities along with necessary precautions.

xi) The Petroleum and Geothermal Energy Resources (Environment) Regulations 2012. The objective of these regulations is to ensure that any petroleum activity or geothermal activity carried out in the state is carried out in a manner consistent with the principles of ecologically sustainable development; and carried out in accordance with an environment plan. Approval of environmental plans that include identification of the environmental impact and environmental risk of the activity; and the implementation strategy included in the environment plan.

2.4.3 Institutional and Governance Arrangements

To implement any law, there needs to be appropriate and adequate institutional and governance arrangements involving various departments and agencies and effective co-ordination among and/or between them.

Australia takes cognizance of the fact that environmental footprint created by mining and mining related activities can be problematic not only now but also in future. Hence the need to start regulating the mines just from the beginning. Hence it is a requirement that all mine closure plans are submitted to the Department of Mines, Industry Regulation and Safety (DMIRS) for approval after preparation in line with the Statutory Mine Closure Guidelines (2020). These mine closure guidelines compel the developers to review approved mine plans after three years or at a time specified by the DMIRS. The updated mine closure plan including any changes must then be submitted again to DMIRS for approval. The monitoring of progressive rehabilitation and mines closure, as per pre-approved completion criteria is carried out by DMIRS.

In order to regulate industrial emissions and discharges to the environment through a works approval and licensing process under Part V of the Environmental Protection Act, 1986, the Department of Water and Environmental Regulation (DWER) was created. It evaluates application for works approval or license against any ongoing obligations that might apply to the premises under the Contaminated Sites Act, 2003 (CS Act). The department administers the CS Act to ensure contamination is identified, recorded, managed and remediated. The department has statutory and non-statutory roles with regard to land use planning processes. Land use related advice generally relates to specific proposals that may impact water resources and the environment or interact with licensed premises.

Further, the Australian Government established an Environmental Protection Authority (EPA) whose role among others is frame up mine closure guidelines in consultation with other departments. Mainly the role of EPA is triggered in Environmental Impact Assessment and management planning (including provisions for rehabilitation) according to the conditions of MoU with DMIRS. For purposes of biodiversity conservation, there exist a Department of Biodiversity, Conservation and Attractions (DBCA) which participates in stakeholder engagement throughout the life of the mine in case the mine lies in or near areas under jurisdiction of the department, disturbs native flora and fauna.

Other participants in stakeholder engagement throughout the life of the mine in case the mine lies in or near areas agriculture, as well as water bodies, is the Federal Department of Agriculture, Water and Environment whose jurisdiction inter alia is to receive referral in environmental impact assessment.

2.4.4 The Land and Environment Court, Australia

The Land and Environmental Court (LEC), established under the Land and Environment Court Act, 1979, is a superior court of record having same jurisdiction as the Supreme Court of New South Wales and is composed of Judges and nine technical and conciliation assessors (Australian Legal Information Institute (AUSLII)). The Judges and Commissioners are appointed by the Governor and the Commissioners are required to have the widest possible qualifications such as special knowledge or qualification in town planning, environmental planning, environmental science including matters relating to protection of the environment and environmental

assessment, architecture, engineering, surveying or building construction, management of natural resources and urban design or heritage.

The Court exercises a combinatorial appellate jurisdiction under planning and production statues and a 'reviewing and enforcement jurisdiction' in relation to environmental and planning statutes. Its jurisdiction extends to matters ancillary to a matter that falls within its jurisdiction, thus enabling it to adjudicate matters which incidentally affect environment. The Court's doors are open to anyone complaining of violation of the relevant statutes. Section 22 empowers the Court to grant all remedies of any nature, conditionally or unconditionally, so that all controversy was completely and finally determined and multiplicity of proceedings is avoided. On the procedural plane, the Court is not bound to follow rules of evidence and may obtain assistance of any person having professional or technical qualifications relevant to any issue.

Justice Paul Stein, Judge , LEC, highlighted the benefits arising out of the Court's integrated jurisdiction over the last 20 years which included decrease in multiple proceedings arising out of the same environmental dispute, reduced litigation with consequent savings to the community, a single combined jurisdiction was administratively cheaper than multiple separate tribunals, greater degree of certainty in development projects reduction in costs and delays which may lead to cheaper project development and cost for consumers and also greater convenience, efficiency and effectiveness in development control decisions.

The LEC has proved to be an efficient and effective in enforcement of environmental related issues. The Court has an established ideal clearance ratio of 100 percent.

2.5 INDIA

India is endowed with huge resources of various metallic and non-metallic minerals. Mining is an important sector in the Indian economy. Since independence, there has been a pronounced growth in the mineral production both in terms of quantity and value. In fiscal 2019, the mining and quarrying sector (at current price) contributed 2.38 percent to the country's Gross Value Added (GVA). In the mining sector, the estimated average daily employment is about 1 million, of which 80 percent is in the public sector.

The country's minerals sector produces about 95 minerals, including four fuel minerals, three atomic minerals, 10 metallic minerals, 23 non-metallic minerals and 55 minor minerals. In fiscal

2018, the private sector played a dominant role in mineral production (excluding atomic, fuel, and minor minerals) accounting for 67.33 percent (in absolute terms $5.7 billion) of the total value. India ranks third in production of coal, aluminum and zinc (slab); fourth in chromite, iron ore, and lead (refined); fifth in bauxite; sixth in copper (refined); and seventh in manganese ore.

The Indian mining industry has a large number of small mines and a few large ones that enjoy a significant share in the overall production. As many as 1,405 mines were in production (excluding atomic, fuel and minor minerals) in fiscal year 2019 (Taxruru, 2019/20).

Despite all the benefits that come with mining and mining related activities, the environmental footprint created by the sector still remain a source of concern. Hence the need for strict measures.

2.5.1 Applicable Environmental Legislation

A number of mining and environmental legislation do exist in India. Existing pieces of legislation include among others the following:

i) Mines and Mineral (Development and Regulation) Act, 1957, as was amended in 2016. The Act governs the development and regulation of mines and minerals under the control of the Union Rehabilitation of flora and other vegetation destroyed by any prospecting or mining operations, in the same area or in any other area selected by the Union or state government (whether by way of reimbursement of the cost of rehabilitation or otherwise) (Source: Government of India Ministry of Mines (India, 2021) – www.coal.nic.in);

ii) Mineral Concession Rules 1960 as was amended in July 26, 2012: The rules define the process of grant of mineral concessions as per the provisions of Section 13 of the 1957 Act. They lay down the process and timelines for grant of concessions, disposal and refusal of applications and the basic conduct of accounts, registers and information reports. The Act compels mining companies to incorporate a progressive mine closure plan in their mining plan as provided for under Section 22 (5) of the Mines and Minerals 1[(Development and Regulation)] Act No. 67 of 1957. It is the state government's responsibility to realize any letter of credit or bond or any other surety, guarantee provided or obtained as financial assurance for the purpose of performance of protective, reclamation and rehabilitation measures as contained in the approved mine closure plan and shall carry out such measures

either by itself, or appoint an agent to do so. The forfeiture occurs on non-performance of the measures contained in the approved mine closure plan. The lessee shall not determine the lease or part thereof closed unless a final mine closure plan duly approved by the Regional Controller or the officer authorized by the state government in this behalf, as the case may be, is implemented as per the approval. The lessee shall be required to obtain a certificate from the Regional Controller of Mines or the officer authorized by the state government in this behalf, to the effect that protective, reclamation and rehabilitation work in accordance with the approved mine closure plan has been carried out by the lessee;

iii) Mineral Conservation and Development Rules (MCDR), 2017: These are rules made under the Mines and Minerals (Development and Regulation) Act, 1957, which apply to all minerals, except: a) petroleum and natural gas; b) coal, lignite and sand for stowing; and c) minor minerals. It covers reconnaissance and prospecting operations; mining operations; general requirements for plans and sections; sustainable mining; notices and returns; employment of geologists and mining engineers; examination of minerals and issue of directives; revision and penalty; geological reports; mining regulation portal; and various schedules and forms. All the rules are applicable to mining and mine closure operation. Some of the specific points in context of mine closure include requirement for the lessee to implement the approved Final Mine Closure Plan and obtain certificate the authorized officer that the protective, reclamation and rehabilitation work have been carried out. Liability of the lessee to provide the financial assurance and pay for any expenditure, over and above the performance security, incurred by the state government. Every mine shall have a progressive and final mine closure plan as per the requirements provided under Section 21 to 27 of the Mines and Minerals (Development and Regulation) Act of 1957;

iv) National Mineral Policy of 2019: For more effective, meaningful and implementable policy there exists a National Mineral Policy of 2019 with the aim of bringing in transparency, better regulation and enforcement, balanced social and economic growth as well as sustainable mining practices. There is need for scientific mine closure (in an orderly and systematic manner) after exhaustion of reserves which will not only restore ecology and regenerate bio-diversity but also take into account the socioeconomic aspects of such closure. To achieve that, the government ensures that post-production mine decommissioning and land

reclamation are an integral part of the mine development process, financial provisions for the costs incurred for mine closure are accorded a high level of priority by the industry, consistent approaches are adopted for efficient and effective mine reclamation and rehabilitation;

v) Granite Conservation and Development Rules, 1999, and Marble Development and Conservation Rules, 2002: These rules were framed under Section 18 of the Mines and Minerals (Development and Regulation) Act, 1957, for conservation and systematic development of granite and marble resources in the country. Every lease holder shall undertake, in a phased manner, restoration, reclamation and rehabilitation of lands affected by prospecting or mining operations and shall complete this work before the conclusion of such operations and the abandonment of the granite quarry; and

vi) Environment Protection Act, 1986, and EIA Notification 2006: This Act authorizes the central government to protect and improve environmental quality, control and reduce pollution from all sources, and prohibit or restrict the setting and /or operation of any industrial facility on environmental grounds. It lays down standards for discharge of effluents, national ambient air quality standards, and the requirements of the environmental impact assessment (EIA) that will lead to environmental clearance. EIA notification mandates environmental clearances for all mines.

2.5.2 Institutional and Governance Arrangements

In the federal structure of India, the state governments are the owners of minerals located within their respective boundaries. The Union government is the owner of the fuel mineral, that is coal and minerals underlying the ocean within the territorial waters up to the Exclusive Economic Zone (EEZ) EI of India. The regulators of the mining sector in India includes the Union Ministry of Mines (MoM) which is responsible for survey and exploration of all minerals, other than natural gases, petroleum and atomic minerals; for mining and metallurgy of non-ferrous metals such as aluminium, copper, zinc, lead, gold, nickel, etc.; and for administration of the Mines and Minerals (Development and Regulation) Act, 1957, in respect of all mines and minerals other than coal, natural gas and petroleum. There also exist the Union Ministry of Coal (MoC) which has the overall responsibility of determining policies and strategies for exploration and development of coal and lignite reserves; sanctioning of important projects of high value and for

deciding all related issues; exploration and development of coking coal and non-coking coal and lignite deposits in India. The ministry is responsible for grant of licenses and allocation of coal mines, approval of mining and mine closure plans, administering the coal mining sector.

The Union Ministry of Labour and Employment (MoLE) has a subordinate department, Directorate General of Mines Safety (DGMS), which administers safety in mines as per the rules and regulations laid down by the Mines Act, 1952. The mission of DGMS is to reduce the risk of occupational diseases and injuries to persons employed in mines. It performs periodic inspection of mines to keep vigil on the status of safety; investigate accidents, danger occurrence and complaints; granting statutory permission for specific mining operation and stipulating precautionary measures while working; undertaking safety initiative, awareness program etc.

No mining activities could be entertained in unless the State Governments grant mining lease. However, prior consent of the Union government is required for scheduled minerals. Geological Survey of India (GSI) (under MoM) which facilitates exploration, geological mapping and mineral resource assessment in the country while ensuring that environmental safeguards are met.

The Indian Bureau of Mines (IBM), a subordinate office of MoM, is mainly responsible for regulation of metallic and non-metallic mining in the country. It works as National Technical Regulator in respect of the mining sector and lays down regulations, procedures and systems to guide the state governments (first tier of regulation) and also provides technical consultancy services. It also approves the mine closure plans as an integral part of the mine plan.

2.5.3 Green Courts in India

In order to strengthen environmental governance, the Indian Parliament under the National Green Tribunal Act 2010, an Act of Parliament which enabled the creation of a special tribunal (Green Court) to handle the expeditious disposal of the cases pertaining to environmental issues. So far, the Indian experience in environmental governance, involving easy access to justice through Public Interest Litigation, demonstrated that independent and powerful Supreme Courts were indispensable for securing environmental justice. It was observed that the Supreme Court were unable to satisfactorily resolve environmental disputes involving scientific and technical questions due to lack of permanent expert panels to assist them. Thus, the Law Commission of

India modelled the idea Specialised Environmental (Green) Courts in the 186th Report. The structure modelled was similar to Courts in Australia and New Zealand.

The Tribunal was tasked with providing effective and expeditious remedy in cases relating to environmental protection, conservation of forests and other natural resources and enforcement of any legal right relating to environment. The Tribunal's orders are binding and it has power to grant relief in the form of compensation and damages to affected persons.

The Tribunal has a presence in five zones- North, Central, East, South and West. The Principal Bench is situated in the North Zone, headquartered in New Delhi. The Central zone bench is situated in Bhopal, East zone in Kolkata, South zone in Chennai and West zone in Pune.

The Tribunal is headed by the Chairperson who sits in the Principal Bench and has at least ten but not more than twenty judicial members and at least ten but not more than twenty expert members. The system is simplified to the extent that any person seeking relief and compensation for environmental damage involving subjects in the legislations mentioned in Schedule I of the National Green Tribunal Act, 2010 may approach the Tribunal, even without the involvement of a legal counsel.

2.6 Reflection

Despite the existence of environmental legislation and respective governance arrangement in Zambia, mining environmental liabilities both from historical and current mining operations have continued to increase as observed in this chapter. Considering the role the mining sector is playing to the national economy, there is great need to improve legislation and enforcement institutional arrangement which will ensure sustainable development of the natural resources.

We can infer from the experiences of the two comparative study countries Australia and India that environmental legislation in the mining sector begin before ground breaking by any Developer. This could be seen by the clear and systematic legislation as well as implementation structures that are put in place. The legislation in both jurisdiction emphasizes on inter alia progressive rehabilitation, taking post-production mine decommissioning and land reclamation as an integral part of the mine development process and frequently updating mine closure plan.

While the mine closure vision (Note: When developing a vision, involvement of stakeholders early in the development is very important as it is the sure way that it can become a shared vision) provides overarching direction for closure, and the principles provide a general framework which articulates what a company wants to achieve post-closure and the legacy it will leave behind, the closure objectives provide concrete, site-specific and typically measurable statements of what closure activities or measures aim to achieve. Individual objectives may be specific to mine domains such as pits, infrastructure and waste disposal facilities, or to aspects of closure. The selection of closure objectives should be informed by consideration of risks and opportunities.

The planning aspect of closure would normally be guided by the mining legislation (APEC, 2018), which lay out the process and prerequisites for closure, components and timing of closure plan, approval and evaluation process and so on. Mine closure legislation is dynamic and evolves rapidly while focusing on approaches towards effective rehabilitation and restoration of the mine sites to minimize the impact on environment. Moreover, socio-economic aspects too are now being considered in the mine closure plans. Essential elements of a successful mine closure governance framework based on leading international guidelines and standards, as well as international experience are developed for reference by governments (APEC, 2018).

In the enforcement of cases dealing with environment, there exist dedicated and specialised courts in the two jurisdictions of Australia and India. The establishment of specialised and dedicated Court facilitates the speedy execution of cases relating to environmental liabilities and have proved to be effective and efficient. It is therefore imperative that this study is undertaken to systematically analyse the extent to which the above laws reviewed in this chapter are applied, and state measures while making reference to good international practices learnt from Australia and India to bridge the existing gaps and weaknesses.

2.7 Conclusion

The chapter gave an overview of the mining sector in Zambia and that it still remains the main stay of Zambia's economy. The chapter has further helped us to understand why the country is still grappling with legacy environmental liabilities which accumulated over a long period of time when the focus was so much on production and not on environmental sustainability. In

1990s, the country started paying attention to the environment and developed the EPPA as well as the policy on environment as elucidated above.

The chapter has also indicated the existing environmental legislations, environmental governance and institutional arrangements in the jurisdictions of Australia and India. The rationale was to understand how Zambia compares with Australia and India and to help in identifying the gaps and weaknesses which exist in our legislation. This is elucidated in chapter five.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

It is clear from the previous chapter that the research is relevant if Zambia is to address environmental issues emanating from both legacy environmental liabilities and the current mining and mineral processing which has continued to affect the communities living in mining areas and cost governmental huge sums of money. This chapter therefore contains information on the approach and research methodology the study applied in order to answer the research question. Several research processes and tools were used to collect both secondary and primary data using qualitative technics as shall be seen in the proceeding sections of this report.

In this study as shown in literature review chapter, information on the comparative studies with the jurisdiction of the Republic of India and Australia depended more on secondary data obtained through desktop reviews.

The chapter further highlights the procedure or criteria used for recruitment of participants, tools or techniques used to collect data, ethical procedure and what appropriate tools were used to analyse the data.

3.2 Qualitative Approach

The study employed the paradigm of qualitative research. In qualitative research, there are a number of considerations that influence the choice of selection of a sample. These include among others:

- The ease in accessing the potential respondents;
- The researcher's judgement that the respondent has extensive knowledge in the area being investigated or under inquiry; and
- The unique features of a particular case (could be a sample) from the rest of the population.

It is therefore important from the onset for the researcher to clearly recognise which research paradigm to use at the time of designing the overall research methodology. Qualitative analysis basically explores participants'/respondents' attitude, behaviour (in the social, economic, cultural and political context in which they occur) and experiences through such methods as interviews or focused groups (Dawson, 2019). This could be summerised as shown in the figure 6 below.

Figure 6: Qualitative Research Analysis **(Source: Dawson, 2019)**

The study drew lessons from Salkind (Salkind, 2006), who stated that in a qualitative research, collection of data could be done through a number of different tools such as interviews, historical methods, case studies and ethnography. In this study, the research methodology was mainly in two parts and these were:

- Desktop Research (literature review); and
- Interviews (semi-structured with open ended questions formulated).

Strategies associated with the qualitative approach are anchored on constructivist perspectives as demonstrated in the proceeding paragraphs.

3.3 Research Methodology

As guided in section 3.2 of this dissertation report, this study employed desktop research in a case study and semi-structured interviews with open ended questions for data collection.

3.3.1 Study Design

This study employed primarily two types of study designs. These were case study and phenomenological study.

a) Case Study

In Case Studies, the researcher explores in depth a programme, an event, an activity, a process or one or more individuals in order to gain an understanding to great depth of the subject being researched on and normally a wide variety of procedures is applied to collect detailed information. In this research, case studies of the Republic of India and Australia were used in order to acquire in depth understanding of how the jurisdictions of the two governments ensure environmental protection or environmental sustainable development in the mining sector. The

rationale was to make comparisons with the Zambian jurisdiction, identify possible weaknesses and gap, and learn best practice that could be domesticated in order to bridge any possible gaps and recommend measures to strengthen the legislation.

Data on these case studies was collected through desktop reviews/studies. Desktop research involved the study, review and analysis of relevant published literature which included among others books, journals, government reports, pieces of legislation and online publications on World Wide Web (www). This was the major source of information in this study to support the comparative study conducted with the jurisdictions of the Republic of India and the Government of Australia. This research gave secondary (as descriptive) data of the specific parameters the study focused on for the purposes of making comparison with the view of getting the desired result as set out in the objectives.

The parameters considered for comparative sake among the jurisdictions of the Republic of Zambia, Republic of India and Australia, included applicable environmental legislation (policy, Laws and Regulations) in the mining sector, environmental governance and institutional arrangements, including enforcement procedures

b) Phenomenological Study

Since the research implored qualitative paradigm, phenomenological study strategy was used. This kind of study is normally applied with the purpose of understanding the essence of one's experiences about a phenomenon. This calls for the researcher to attempt to understand same experience from the participants' point of view (Cresswell, 2003).

This study involves studying a small number of subject through extensive and prolonged engagement to develop patterns and relationships of meaning. In this study, "Efficacy of Environmental Laws in Zambia's Mining Sector", key institutions especially those directly responsible for enforcement of laws designed to protect the environment (air, soil and water) and promote sustainable exploitation in the extractive industry were identified as stakeholders. These included ZEMA, MSD and selected municipalities within the mining towns (Kabwe, Kitwe and Chingola districts).

The other categories of stakeholders identified were institutions whose services to the public are likely to be affected in case of pollutants escaping from the mining operations/activities that are not properly regulated. These included the water utility companies and the Department of Forestry. The last category of stakeholders selected was the communities in mining towns. The selection of stakeholders was carefully done in order to eliminate biases. For respondents in category one, participants were selected from Senior Management and middle managements, the same applied to category two respondents. As for category three respondents, the choice of selection with the guidance from the local authorities, was based on their status in the community. The participants were either ward councillors or members of the ward development committees who represent and live with communities.

Data from stakeholders was collected through semi-structured interviews (as shown in Appendix 3) both face to face using printed questions and also using just printed questions in institutions were Covid 19 measures were strict and could not allow face to face interaction..

3.4 Ethical Clearance

For a research to be conducted, there is need to seek ethical clearance from the relevant research ethics committees. As provided for under Section 9 (Procedure for Submission of Research Proposals for Masters and Doctoral Degrees) of the Directorate of Research and Graduated Studies (DRGS) Graduate Regulations for Postgraduate Training, the University of Zambia, every research proposal has to be approved by the Directorate of Postgraduate Studies Committee. Basically this is meant to establish whether the proposal research requires ethical clearance from the University Ethics Committee. In section 11 of the DRGS Handbook regulations, provides that each school shall direct research proposals to the appropriate University Ethics Committee for approval and these are as follows:

- The schools of Agricultural Sciences, Medicine and Veterinary Medicine Research Ethics Committee;
- The School of Education, Humanities and Social Sciences, Law and INESOR Research Ethics Committee; and
- The School of Engineering, Mines and Natural Sciences Research Ethics Committee.

This research was not an exception. An application for ethical clearance was made to Directorate of Research and Graduate Studies (DRGS). Subsequently, an approval letter permitting the study to proceed for a period of twelve (12) months was issued by Natural and Applied Sciences Research Ethics Committee (NASREC) (Appendix 2). The approval granted was accompanied by conditions which the researcher (or Principal Investigator) is required to abide by contrary to which the approval letter becomes invalid. The condition of grant included inter alia the following:

- No participant would be involved in the study prior to the approval or after expiry date;
- All recruitment material to be approved by NASREC.

Before interview were conducted, it was ensured that the participants were made comfortable by means of an introductory letter (Appendix 2) issued to the researcher by the Dean of School of Engineering – UNZA and an ethical clearance letter(Appendix 1) for the study. It was further emphasised that the information was purely meant to be used for academic study (research) purposes to be submitted to the University of Zambia in partial fulfilment of the Master of Engineering in Environmental Engineering. All participant were not bound by their submission in any way.

3.3 Data Collection Tools

In the research, data/information was collected mainly through desktop review (written documents) and interviews. Sources of secondary data included books, journals, and World Wide Website (www). Further, open ended interview questions were formulated to suit a particular category of stakeholders as shown in appendix 3. The differences in the set interview questions were as a result of specific objectives for engaging each stakeholder. The first set of questions targeted regulatory authorities in charge of environmental protection. The key stakeholders identified under this category included ZEMA, MSD and selected municipalities – Kabwe, Chingola, Kitwe and Mufulira Municipal Councils. However, there was no response received from Kitwe City Council and Mufulira Municipal Council. The second set was for institution or companies whose services to the public could be interrupted by mining operations if not well regulated. The institutions included water utility companies and Forestry Department. The last set was meant to target communities living in close proximity with the mining operations.

The stakeholders engaged are discussed fully in Chapter four.

3.6 Methods of Data Analysis

This research applied two types of research designs. These are case study and phenomenological study, therefore the analysis methods applied were synchronised with a specific design.

In the case of data collected for purposes of understanding in great depth the situation, the applicable data analysis tools were:

a) Categorization and interpretation of the data into common themes; and
b) Synthesis to create or develop an overall portrait of the case.

In this study, categorization and interpretation of data into common themes was used as shown in chapter four. On the other hand, data collected through interviews of selected participants using semi-structured open ended interview questions was analysed by considering the general description of the experience.

3.7 Data Collection

As indicated in section 3.2, data collection was done through desktop reviews and structured interviews with heads of departments of government institutions responsible for the regulation of the environment in the mining sector of Zambia, water utility selected water utility companies, department of forestry and the community living in close proximity with mining operations.

3.7.1 Case Study

Secondary data was collected through desktop research by studying, reviewing and analyzing relevant published literature. Data collection was guided by the following questions:

a) What is the applicable environmental legislation (policy, laws and regulations) exist in the governance of the environment in the mining sector of the jurisdictions of the Republic of India, the governments of Australia and Zambia?

b) What institutional arrangements exist in institutions responsible for the enforcement of environmental legislation in the mining sectors of the republic of India, the governments of Australia and Zambia?

c) What enforcement procedures and penalties exist?

3.7.2 Phenomenological Study

Data collection was conducted using structured open ended interviews with the Heads of Departments as well as the middle management staff in the identified key institutions with the regulatory mandate for the environment in Zambia. Three categories of stakeholders were interviewed one on one and responses recorded on data sheets developed. The first category targeted some of the institutions in Zambia entrusted with environmental regulatory mandate especially those located in towns were mining activities have had and/or have continued to have an impact and these were ZEMA, MSD, Kabwe Municipal Council, and Chingola Municipal Council. The second category focused on institutions whose service to the public were/are likely to be negatively impacted by mining activities if not well regulated. These included the water utility companies (Lukanga Water Supply and Sanitation Company in Kabwe (LgWSC) and Lusaka Water Supply and Sanitation Company (LWSC)) and the Forestry Department. The respondent recruited from LWSC was a former employee of Mulonga Water Supply and Sanitation Company (MWSC) and was well informed about the impact of mining activities in Kitwe and Chingola too. The last category targeted members of the communities living in mining towns. Participants from the members of the communities were identified from among members of the Ward Development Committees (WDCs) as well as the ward councilors with the guidance from the local authorities of Kabwe and Chingola Districts.

Letters were sent prior to conducting interviews to managements in institutions hosting participants to seek for authority or permission. Time for interviews were scheduled at the participants' convenience. A total number of sixteen participants (as shown in table 2) were recruited and responses were recorded from them using an interview guide containing interview questions provided to them prior to one on one interview sessions. The interview sessions lasted on average for 30 to 40 minutes. To enhance anonymity and confidentiality of the participants, names were replace by numbers.

Table 2: Distribution of Participants

S/N	Group	Number of Male	Number of Females
1.	Zambia Environmental Management Agency (ZEMA)	1	1
2.	Mines Safety Department (MSD)	2	0
3.	Kabwe Municipal Council (KMC)	2	1
4.	Chingola Municipal Council	2	0
5.	Lukanga Water and Sanitation Co.	1	0
6.	Lusaka Water and Sanitation Co.	1	0
7.	Department of Forestry	1	0
8.	Local Community Leaders - Kabwe	2	0
9.	Local Community Leaders - Chingola	2	0
	Total	**14**	**2**

(Source: Author)

Summaries of participants' responses are presented in tables 3, 4 and 5 in Appendix 3.

3.8 Chapter Summary

The chapter has highlighted the approach and research methodology employed during the study. The study employed the paradigm of qualitative approach. Two different types of study designs were used – case and phenomenological studies. Case study mainly focused on desktop reviews and studies whereas the phenomenological study involved participants from the identified key institutions as elucidated in section 3.7'. Data was collected through desktop reviews and semi-structured interview questions. For the case study, secondary data was collected through desktop reviews by answering a set of well throughout question tailored to help in answering the research questions which bordered on applicable environmental legislation, as well as the enforcement institutional arrangements. Further, primary data for phenomenological study was collected using open ended interview questions prepared as per category. Participants were put into three categories – regulatory institutions, the community and service providers such as water utility companies as shown in Appendix 3. All this was done in order to help with systematic interpretation and analysis of data as shown in chapter five

Interpretation was data was done through categorization of common themes and synthesis to create or develop an overall portraits of the case as shown in chapter five.

CHAPTER FOUR: RESULTS

4.0 Introduction

This chapter present results of the primary research collected from case study (comparative) analysis and the qualitative interviews analysis which were conducted for this research. The analysis of both case study assessment and phenomenological study was conducted in this chapter in order to develop a comprehensive understanding of the extent to which environmental stewardships are applied in the Zambia's mining sector and their efficacy, identify existing weaknesses or gaps, and assess capacity of the institutions responsible for the implementation of the existing environmental legislation. In a comparative analysis, data was categorized and interpreted into common themes (Leedy, 2001). The comparative study was meant to address objective number three of the study. Objective questions as elucidated in section 3.7.2, were posed during the interviews and these helped in addressing the objectives (one and two) of the research. Data collected from interviews was analysed based on general description of the experience. Results were presented as per research design as shown in the proceeding sub-section of this Chapter.

4.1 Comparison in Implementation of Environmental Legislation in Zambia, Australia and India

The comparative study was based on specific objective number three (Identify the weaknesses/gaps existing in the current legislation and make recommendations - taking into account good international practices). This Section therefore, highlights the results of the case study by identifying and comparing critical areas between Zambia and the two comparative study countries (Australia and India). The comparison inter alia focused on benchmarks of good environmental standards, mine closure plan, institutional and governance arrangement, procedures and preconditions necessary to return land to the State, framework for post closure land stewardship and monitoring, and mechanism for granting mining tenements over rehabilitated mine sites or indeed on a tailing dump facility.

4.1.1 Benchmarks of Good Environmental Standards for Mine Closure

A review of the two countries (Australia and India) selected for purposes of comparative studies and benchmarking exercise covering part of the mining and environmental legislation and stakeholders involved was considered in Chapter two (Literature Review). A review of these legislation, as prevalent in Australia and India have been undertaken across a range of mine closure parameters. The key parameters isolated for the sake of this study included Mine Closure planning, Institutional and Governance arrangements, Procedures and pre-conditions necessary to return land to the state following closure, Frameworks for post-closure land stewardship and monitoring and Mechanisms for granting mining tenement over rehabilitated mining sites/ tailings dams.

a) **Mine Closure Planning**

In good mining practice, the aims of the closure plan are set out through its underlying vision, principles and objective (ICMM, 2019.) Site-specific closure objectives are developed taking into consideration the overall vision for the site and closure principles that may be applicable to abroad range of sites. Although different companies may use different terminology for these concepts, the underlying approach is usually similar.

The proceeding paragraphs endeavour to zero on selected study parameters for Zambia and subsequently compares them with Australia and India:

i. Whether mine closure is a statutory requirement: It is clear from the literature reviewed that mine closure is a statutory requirement for Zambia, Australia and India. However, for Zambia it is a conceptual plan prepared at the pre-project stage while for Australia and India mine closure plans are prepared in detail as per guidelines and are updated frequently. In Zambia, mine closure plans are received as part of the EIA document, which in turn is prepared as per the prescribed structure in the Environmental Regulation 1997. It is evaluated by the ZEMA in consultation with various regulatory agencies, most significant among is the MSD. The feedback from the other Regulatory agencies is taken and decision made. A positive or negative Decision Letter is then issued. In Australia the closure plan is evaluated by DMRIS as per self-appraised checklist as contained in the statutory guidelines. The checklist acts like a preliminary check to evaluate whether all components have been provided or not. The contents

of the closure plan is evaluated to assess the closure obligations, closure outcomes, post mining land use, completion criteria, adequacy of rehabilitation measures provided to reach completion criteria, cost estimation. While in India, the IBM reviews the closure plans for Metallic/non-metallic and coal mines respectively. In India, at the initial stage only progressive mine closure plan is required which has to be prepared and approved every five years by the agency. This provides an opportunity to revise or update depending on the circumstance at hand. This may include emerging issues triggered by advancements in technology.

In the Zambian jurisdiction, a closure plan is required to be submitted as a part of the Project Brief or the Environmental Impact Statement, when applying to ZEMA for a Decision Letter. The Decision letter is in turn required as part of the mine right application or is a mandatory submission after receiving an exploration right or mineral processing right but prior to their components. Whereas a mine closure plan in Australia is required to be submitted along with the mining proposal for grant of mining tenement. In India, a progressive or Concurrent Mine Closure Plan, as a component of Mining Plan prior to grant of lease is required and then a Final Mine Closure Plan follows after two years (in case of metallic and non-metallic) and five years (in case of coal and lignite) prior to the proposed closure of the mine.

ii. Mine Closure Guidelines: There are no formal separate mine closure planning **guidelines** available but mine closure plans are prepared as a part of the Environmental Impact Statement process in Zambia whereas in the case of Australia, there exit Statutory Guidelines for Mine Closure Plans formulated and revised in 2020 by the DMIRS and EPA. For India, the format for mine closure guidelines is prescribed separately by the IBM) and Ministry of Coal. The Ministry of Coal in India has overall responsibility of determining policies and strategies in respect of exploration and development of coal and lignite reserves, sanctioning of important projects of high value and for deciding all related issues.

iii. Non-compliance of statutory provisions: In case of violations observed during inspections and monitoring, action taken by regulatory agency in the case of Zambia, provisions to be evoked are provided under Part IX of Mines and Minerals Development Act, 2015 and Part XI of Environmental Management Act, 2011. Suffice to mention that in practice, the same offence may get covered under both MMDA, 2015 and EMA, 2015 owing to the duplicity in roles of the MSD and ZEMA regarding compliance. However, only one authority usually

penalises in such cases (The spirit of principles of Justice – a person cannot be punished twice over the same office (Parliament of Zambia, 1990). The DMIRS promotes and facilitates Compliance through targeted communication, engagement and by providing timely information and advice whereas India, the central government authorized agency or officer to enforce the MMDR Act. The violating party is given a show-cause notice to clarify its stand on non-rectification and a criminal proceeding may be lodged against the offender.

iv. Management of Environmental Protection Fund: In an event that the developer fails to comply and execute closure plan, the government will utilize the funds collected from the developer through EPF contributions for rehabilitation or closure of that project as that becomes a liability of the government. This is a scenario existing in Zambia. In Australia, the approved financial institution providing the UPB remains liable to the government even when a tenement holder is in bankruptcy or liquidation. The government may use this bond to rehabilitate the mine and also money can be utilized from the Mine Rehabilitation Fund to rehabilitate the mine.

v. Post closure monitoring and land management: As to whether there exists any system of monitoring and managing the land and remaining buildings/facilities after closure and Abandonment by the developer, in Zambia it is not clear although it is required under Environmental Regulation, 1997 that the cost of post closure monitoring or management be calculated. But the implementation mechanism is not defined since the land is returned to the owner after closure or can be leased to the new lessee or even the operation continued after expiry / revocation of previous lease by decision of Director, till new lessee is found. In case of Australia, yes there exist a system, as Provision of Completion criteria, Post closure land management as agreed with the stakeholders during planning. A whole-of mine life process, that typically culminates in completion of all obligations under the Mining Act. 1978, government 'sign-off' and responsibility has been accepted by the next land user or manager. It includes decommissioning and rehabilitation while in India, there is an indication in the guidelines for post closure monitoring by the Ministry of Coal which require that the abandonment cost include "…post environmental monitoring for 3 years, supervision charges for 3 years, protective and rehabilitation. Measures including their maintenance and monitoring, miscellaneous charges etc." IBM also required a submission.

It is therefore good practice for the Developer to develop maps of the post-closure landscape and evaluate post-closure land use for areas with common capability. At the earlier stages of planning, these may be relatively large/coarse blocks of land and broad categories of land capability. As closure planning reaches more detailed levels, additional detail on land capability may be added as required. For example, in the early stages a large area may be identified as suitable for agricultural use post-closure, and at the more detailed planning stages, this area could be subdivided into different types of agricultural use depending on capability (ICMM., 2019).

b) **Institutional and Governance Arrangements**

To implement any law, there needs to be appropriate and adequate institutional and governance arrangements involving various departments and agencies and effective co-ordination between and/or among them. Institutional and governance arrangement are well elucidated in Chapters 2 of this study.

c) Procedures and Pre-Conditions Necessary to Return Land to the State Following Closure

The approach towards environmental protection and reclamation has adopted for mining companies to take care of any surface safety hazards and securing the pits, flooding open pits and, where needed, providing for pumping or drainage of water from underground workings nearby and sealing the entryways, shafts, and any other opening. Good practices today require removing unwanted plants and equipment, stabilizing and securing waste dumps and impoundments, detoxifying hazardous materials, protecting ground water, addressing any acid rock drainage issues (which in the worst cases can be a severe problem an example of Japan), and reclaiming, rehabilitating, and revegetating land in a manner compatible with local vegetation. Most mine production assets have little value at closure. Some assets such as tailings impoundments, open pit and underground mine workings, and dumps cannot be removed, and these should be stabilized and made secure and safe. Some of these assets could be used for example disused open pits could be turned into boat cruise, fish pond whereas underground working into museums, shopping mall for example the Canal Walk in Cape-Town.

There is need to tighten the procedures for mine closure and be defined clearly in the statutes. Prior to handing over of the land to the owner (State), after mine closure, the conditions that need

to be verified have to be prescribed in the statute. The existing provisions in this regard applicable to Zambia and to the two comparative countries are summarized below:

i. **Zambia:** After the rehabilitation works are carried out and the mine or dump closed or processing plant dismantled, the developer has to obtain both "closure certificate" and "certificate of abandonment" before the land could be made available for other land use. In case the government wants to retain it, then fair compensation shall be paid to the owner.

ii. **Australia (Western Australia)**: In the first stage of a mining project, a mining lease typically grants the holder the right to exclusive possession of the tenement area for mining operations. If a tenement holder seeks to engage in mining or exploration activities on private land, there is an obligation to consult with the private landowner and agree terms governing access and compensation. Additionally, the landowner will be engaged through the continuous stakeholder engagement plan approved in the mine closure plan. Thus, the potential post closure land use will have to be discussed, and the concerns of the stakeholders shall be resolved (for example, about any hole or pit to be left behind after mining). For example, the mine closure plan will include in its design those measures that will be taken to ensure safety of human and animal, the pit cannot be backfilled, etc. The stakeholder should accept the response for this to be considered a completion criteria for monitoring at the end of the post-closure stage. In case the land under consideration was not under private ownership, even then land management at the time of closure is proposed in the latest updated approved mine closure plan, but it is done after consultation with local stakeholders, native communities, local government and DMIRS. This post-closure mine land management is then approved by DMIRS. In order to demonstrate compliance with approved updated mine closure plan, post closure land management must be as per agreed conditions with the stakeholders during planning.

iii. **India**: A Certificate of Completion of Closure Activities as provided in MCP is required from the Coal Controller (MoC) and Authorised Office (IBM) to the effect that the protective, reclamation and rehabilitation works carried out in accordance with the approved mine closure plan/final mine closure plan. Thereafter, land is surrendered to the state government. The lessee shall inform the Authorised Officer/ Coal Controller before 90 days of proposed closure of mine with notified third party audit report (if coal and lignite mine) to Controller, while in case of metallic and non-metallic mine, the Authorised Officer does site inspection with the officer of

the state government. If the Authorised Officer/ Coal Controller has reason to believe that the provisions of the approved MCP have been complied with, then they issue Closure Certificate and Financial Assurance shall be released. Otherwise, further action is taken for remediation of site either by the Authorised Officer/ Coal controller or by an agent after forfeiting the sum assured value and the extra money, if any, occur in doing so, the lessee shall pay.

d) **Frameworks for Post-closure Land Stewardship and Monitoring**

As indicated in Chapter One of this study, the Government of the Republic of Zambia has been making efforts to rehabilitate and remediate the environment impacted by legacy mining activities. Some facilities have continued to pollute the environment despite being under private ownership. In order to avoid similar incidences in future, it is imperative that the environmental legislative framework tackling post mine closure land stewardship and monitoring are adequately developed so as to ensure the responsibility is bone by the polluter.

By properly designing the means to address the environmental aspects of the closure process and the post-closure situation, mining companies greatly help the social sustainability of the community after the mine closure. This is especially the case for rural and farming communities. The aspect of post-closure monitoring arrangements answer questions such as who monitors, for how long, who pays, who enforces compliance with environmental requirements.

The existing provision in the legislation that addresses the component of post-closure land management and monitoring in the countries under study are as follows:

i. **Zambia**: A mining area shall, upon cessation of mining operations by the holder of the mining right or mineral processing licence, revert to the owner of the area, except that if the Director of Mines Safety Department determines that the area should be retained by the government, the government may retain the area subject to payment of fair compensation to the owner of the area. Further, Section 5(2) (d) of the Mines and Minerals (Environmental) Regulations 1997 requires to calculate the operational cost of protecting the environment after the closure of the mine. Section 5(4) of the Mines and Minerals (Environmental) Regulations 1997 mandates the developer to make a commitment, in writing, to the Director to meet the costs referred to in sub-regulation (2) and implement the environmental impact statement. MMDA also states “where the holder of a mining or non-mining right abandons

the land subject to the mining or non-mining right or the mining or non-mining right is revoked, the Director of Mines shall take the necessary measures to ensure that where an activity provided for under the mining or non-mining right can be continued before a new mining or non-mining right holder takes over the activity."

ii. **Australia (Western Australia)**: The land would be returned to the government after mining or to the private land owner, as per the agreed terms and conditions. However, the relinquishment of land after demonstrating compliance to completion criteria is not mentioned separately in the 2020 Guidelines for Mine Closure but the 2015 guidelines state that relinquishment of a tenement requires formal acceptance from the relevant regulators that all obligations under the Mine Closure Plan associated with the tenement, including achievement of completion criteria, have been met and, where required, arrangements for future management and maintenance of the tenement have been agreed to by the subsequent owners or land managers. There must be an explicit, written legal agreement with the subsequent land managers to accept the mining legacy obligations and any outstanding costs of remediation, monitoring and reporting. For any transfer of responsibility for remediation to be recognised under the Contaminated Sites Act 2003, the written approval of the Chief Executive Officer of DER must be obtained in accordance with section 30 of that Act." Further, the provision for post-closure monitoring was to be included at the mine closure planning stage itself and updated every three years. Two years before the actual closure, the final mine closure with the post-closure monitoring plan has to be prepared by the project proponent and got approved from DMIRS. The monitoring period has to be reasonably decided by the project proponent themselves and can last ten years. It can be seen that the liabilities of the lessee continue even after expiry of the lease.

iii. **India:** There was an indication in the guidelines for post-closure monitoring. The guidelines for preparation of mining plan for mine closure requires that the abandonment cost include "post environmental monitoring for 3 years, supervision charges for 3 years protective and rehabilitation measures including their maintenance and monitoring, miscellaneous charges and so on". Similarly, the IBM Manual for Appraisal of Final Mine Closure Plan (Exclusively for leases wherein mineral exists and closure was as per the provisions of Section 8A of

MMDR Amendment Act 2015), July 2018, in the format for preparation of Final Mine Closure plans, requires in post-closure monitoring schedule as envisaged and estimated cost.

e) Mechanisms for Licensing Rehabilitated Mining Sites/ Tailings Dams

Mines typically follow a set path from prospecting to development to extraction and finally closure as the finite resources are exhausted. As already noted, all mines generate waste such as tailings. Often these solid wastes are stored at or near the mine site itself. Instead of being simply dumped, mine tailings can be re-mined since they often contain significant amounts of potentially valuable metal content particularly in old mines whose efficiency of flotation technologies used to concentrate target minerals was not as good as those currently available. Revisiting mine tailings can not only increase the working life of existing mines, it can also potentially breathe new life into long abandoned mine sites. In the case of Zambia, which has a long history of copper mining, a large amount of copper was estimated to have found its way into the old tailings areas including other minerals. With advancement in technology, what was waste yesterday could be a resource today and recoverable profitably. However, there exist no clear cut direction and mechanism on the granting of mining tenements on abandoned or rehabilitated tailings and over burden dumps for potential exploitation. In the case of Zambia, the re-processing of an abandoned or rehabilitated tailings dam or over burden dump/waste rock within a tenement already under a mining right could be carried out by the mining right holder without any additional license. In an event that the tailings dam is devoid of any mining rights, then a new applicant can apply to obtain the mining rights by following the same process as any other new mining right applicant. Both Australia and India have similar arrangement in this regard with Zambia.

4.1.2 Gaps Identified

The comparative view of the application of environmental legislation and respective institution of enforcement between the jurisdiction of Zambia and that of Australia as well as India, has reviewed areas that Zambia can work on to improve the way the mining sector is regulated in line with environmental compliance. Mine closure plan is an issue integral to mine planning which should be incorporated from the early stages. Zambia can learn vital lessons from the Australia and India regarding implementation of mine closure guide lines. The jurisdictions of Australia and India compel mining operators to prepare detailed mine closure plans which are

regularly reviewed by specialist department and/or agencies to ensure compliance with acceptable international environmental good practice. It is important for Zambia to move away from relying on a conceptual plan prepared pre-project stage and only reviewed during the Environmental and Social Impact Assessment preparation.

Further, there exist no formal separate mine closure guidelines available in Zambia, However, Australia, as revised in March 2020, has Statutory Guideline for mine closure plan while India guidelines are always prescribed separately by specialised IBM and MoC. There is therefore need to put in place systems to focus on post closure land management. Also great lessons can be drawn from the efficient way of executing environmental related case through specialized systems such as Green Court arrangement as the case is in both India and Australia.

4.2 Phenomenological Study – Open Ended Interview

Phenomenological study undertaken was meant address the first and second objectives primarily. The analysis of data collected through open ended interviews followed the data analysis plan highlighted in the methodology subsection of Chapter three. Data was transferred from the interview data sheets and transcribed into a word transcript then saved. Key to a good quality data analysis is the researcher having a clear understanding of the data and linking it to the research question throughout the analysis. Data was carefully compiled, examined, classified, arrayed and displayed in different forms while searching for patterns, insights, and concepts before drawing conclusions (Yin, 2014). As per norm when conducting interviews, written memos were taken and were later used to develop ideas that worked well for data analysis done while collecting data. The use of written memos in a qualitative research design especially in an interactive approach is encouraged (Maxwell, 2013). The respondents were grouped into three categories as was shown in Chapter three. Therefore in this section, analysis was conducted as per category and corresponding findings recorded. The interpretation of data was done manually using thematic analysis. The analysis involved a comprehensive review of the transcripts to capture all the relevant themes and pattern. In this study, a total number of sixteen (16) participants were involved. The central research question for the study was: Efficacy of environmental legislation in the mining sector of Zambia.

From table 5 in section 3.7.2, 14 out of 16 participants were males and 2 were females. The researcher did not have control over gender as participants were assigned to the study at the discretion of the heads of the institutions identified as stakeholders. It was hoped that the assigned staff were experienced enough. As was shown in Chapter 3, in a phenomenological study design, a researcher attempts to understand an experience or phenomenon from the participant's point of view.

4.2.1 Category One Participants

These involved identified regulatory institutions responsible for environment in the mining sector. These are ZEMA, MSD and the local Municipalities of Kabwe and Chingola Districts. To get participants from these institutions, formal letters to heads of institutions/departments were written and in turn at their own discretion assigned participants to the study as mentioned earlier. This category had a total number of nine (9) participants. Participants requested for from each department consisted of a representation of senior management (mostly involved in policy formulation, supervision and so on) and middle management (front runners in implementation – inspections, monitoring, auditing and so on) with the view of eliminating possible biases in the responses. Responses to all the interview questions were documented as per institution as it was discovered that feedback received was very similar. Responses to the interview questions were carefully examined and eventually used to come up with the themes which were eventually used to complete the analysis. Analysis conducted using the following themes:

a) Institutions with Regulatory Mandate to Protect the Environment

The first interview question asked to participants only in the first category contributed to the development of the theme. Participants were asked what mandate their institutions have in environmental management in the Country. It was clear from the responses given by the respondents that ZEMA has a leading role of regulating and coordinating management of natural resources and prevent and control environmental degradation for sustainable development. ZEMA's responsibilities cuts across various sectors. On the other hand, the responsibility in management of environment of MSD as a specialized department on safety and health of the environment and person is limited to areas of mineral exploration, mining and mineral processing operations throughout the country. MSD is further responsible for

formulation and enforcement of occupational health and safety and also for promotion of environmental management programmes and prevention of wasteful practices in the mining industry (MMMD, 2018).

The feedback from the municipalities of Kabwe and Chingola, shows that at a local authority level, they too have a responsibility of ensuring that the environment within their jurisdictions are safe and health for the residents. Examples include among others burying of abandoned ditches (these may most likely be associated with open cast mining operations and quarrying). They have the responsibility of preventing environmental pollution and also of ensuring sustainable solid waste management.

All these institution are established under different Acts of parliament. There is need for improved collaborations among the institutions responsible for environmental protection.

b) Existing Policy Guiding Operations

A policy is said to be a course or principle of action adopted or proposed by an institution, government, party, business, or individual. The importance of having a policy in place cannot be over emphasised as it provides guidance, consistency, accountability, efficiency, and clarity on how an organization operates (SCHL, 2018). Having a clear and consistence policy offers members of an institution guidance and principles to follow. It offers guidance (road map) in the sense that it define the goals of an organization by providing guidance about how to achieve objectives, identify key activities, and can also provide guidance for the board on how to handle issues as they arise. Consistency by establishing procedures to ensure the organization's processes do not deviate or deteriorate over time, even if key board members, contractors or employees leave. Consistent policies also help new board members get up to speed quickly on how the organization operates and what's expected of them as a board member. Accountability in the sense that policies and procedures are well established and consistently followed, an organization can refute allegations of unfairness or legal violations that residents may file against it. It is the goal of every organisation to be efficient. Efficiency entails that formal, written policies and procedures improve overall organizational performance by keeping everyone abreast when it comes to expectations and issues. It is further important that the policy is clear. Suffice

to say that when everyone has some higher level of clarity about what needs to be done, how it needs to be done and who's responsible for doing it, it leads to smooth operations.

A second interview question on the existing policies guiding the operations of the environmental regulatory institutions and when they were formed was asked. This interview question was very important as it helps in answering the research question number 2. A careful review of the compiled data from all the stakeholders response to the question revealed that at least each institution has a policy guiding its operations. It is very important to have policies in place as they guide what kind of laws and institutions should be in place to ensure realization of an organization's goals/visions. ZEMA indicated that as an institution they are guided by the National Policy on Environment which was developed in 2007. National Policy on Environment (NPE) is the principal policy that coordinates environmental management in Zambia. The NPE is designed to create a comprehensive framework for effective natural resource utilization and environmental conservation which will be sensitive to the demands of sustainable development. The policy focuses on among others:

- Promoting the sound protection and management of Zambia's environment and natural resources in their entirety, balancing the needs for social and economic development and environmental integrity to the maximum extent possible, while keeping adverse activities to the minimum;
- Managing the environment by linking together the activities, interests and perspectives of all groups(people, Non-Governmental Organizations (NGOs) and other government departments at both the central and local levels);
- Accelerating environmentally and economically sustainable growth in order to improve the health, sustainable livelihoods, income and living conditions of the poor majority with greater equity and self-reliance;
- Ensuring broadly-based environmental awareness and commitment to enforce environmental laws and to the promotion of environmental accountability;

- Building individual and institutional capacity to sustain the environment, regulate and enforce environmental laws, and promote the development of sustainable industrial and commercial processes having full regard for environmental integrity.

As one of the technical departments under the Ministry of Mines and Minerals Development, MSD is guided by the Minerals Resources Development policy developed in 2013. The policy among others encourages sustainable mining while so as to achieve a socially and internationally acceptable balance between mining and the bio-physical environment and to ensure that acceptable standards of health. Safety and environmental protection are observed by all participants in the mining sector (GRZ, 2013). On the other hand, the municipalities do not have a standalone policy on environment as they depend on the National Policy on Environment. However, three of the participant from KMC indicated that as an institution they are being guided by Local Government Act No. 2 of 2019, Solid Waste Regulation and Management Act, Public Health Act Cap 295. By and large KMC also depend on NPE.

As a general rule, an institution should review every policy between one and three years (PowerDMS, 2020). However, most policy management experts recommend that policies are reviewed every year. In certain cases you may not need to wait for a year when their dynamic changes especially in an event of aligning institutions to internal/global conventions or agreement. A participant from ZEMA indicated that the current environmental policy (2007) was scheduled for review. It is clear that a lot of thing have changed in the last 15 years in the world of environmental protection in terms of technology and so on. The mineral resources development policy is over 8 years old likewise would require review as it regulates one of the most important sector in the Country.

c) Institutional Arrangement

Structures or mechanisms of social order, set up to govern the behavior of a set of individuals within a given community. Institutions are identified with a social purpose, transcending individuals and intentions by mediating the rules that govern living behavior. UNDP definition: Institutional arrangements are the policies, systems, and processes that organizations use to legislate, plan and manage their activities efficiently and to effectively coordinate with others in order to fulfill their mandate. Institutional arrangements further, refer to formal government

organizational structures as well as informal norms which are in place in a country for arranging and undertaking its policy work. These arrangements are crucial as they provide the government at all levels (federal, provincial and Local) with the framework within which to formulate and implement policies. Informal institutional structures include the general public, non-government organizations and private sector groups that are not official institutions (GGIM, 2017).

In this study, understanding institutional arrangements for environmental regulatory departments/agencies is very critical. The theme was established from the interview questions number 2, 3, and 4 "What is the structure (establishment) of your institution? Describe the proposed amendment (if any) to the existing structure and the reason?" What is the total number of staff responsible for environmental monitoring /inspection/ compliance? How many departments does your institution have to carry out environmental monitoring/ inspection/ compliance? These questions were important as they helped in answering research question number 2, "what is the capacity and enforcement procedures of the institutions responsible for the implementation of the existing environmental laws in the Mining Sector".

ZEMA has five directorates, Operations, Planning, Information and Research, Human Resources and Administration, Finance, Accounts and Procurement, and Legal Services. This is followed by Managerial positions: Manager- Environmental Assessments, Operations, Planning and Climate change and Natural Resources. The institution has five technical units focusing on environment and each unit is headed by Principal Inspector. Operations Department is the department entrusted with environmental monitoring and inspection to ensure environmental compliance across the Country. The operations department comprises units which are Environmental Assessment, Pesticides and Toxic Substance/Ozone Depleting Substances, Waste Management, Air and Noise, Climate Change and Natural Resources, and Water Resources. The institution had no immediate plans to change the establishment as the organisation structure was approved in 2016 by ZEMA board which saw the number of staff increased from 91 to 241. The increased staff level enabled the institution to open new offices in Solwezi, Nakonde Border, Chipata and Mongu offices. The participants further indicated the Operations department only has fifty-seven staff currently employed as opposed to seventy – two as per establishment.

Participants at MSD indicated that MSD is headed by a Director who is seconded by two Chiefs (Inspector of Mines and Inspector of Machinery), Principal Inspector, Senior Inspector,

Inspectors and a chain of support staff. The department is made of four units (Crisil, 2020): Machinery Unit, Mining Unit, Explosive Unit and Environmental Unit. The participant from MSD indicated that of these, only two units play a role in mine closure monitoring, inspection and enforcement, as follows:

- Mining Unit is responsible for carrying out inspections, mining safety audits and risk assessments targeted towards large and small mines in order to enforce mining and explosive regulations; and
- Environmental Unit is responsible for sustainable exploration and mining of mineral resources and achieve an increase in investment and job creation.

The response from the two municipalities of Kabwe and Chingola districts were similar on their establishment. That was expected since all municipalities are established under one Act and mandated to carry out the same functions though in different localities/districts. However, the participants from the Municipalities indicated that there institutions are headed by the Town Clerk who basically is the Chief Executive Officers. The Town Clerk is supported by seven directors each heading a department and their assistants (Chiefs) and other senior officers. Further, the Town Clerk looks up to the Mayor who is a Chairperson of the full Council Committee of Councillors whose responsibilities among others include making of By-Laws/Resolution that are implemented by the Town Clerk and his technocrats.

Participants from Kabwe Municipal council indicated that the institution has ten Public Health Officers who carry out inspection and monitoring, although there are still other from the department of planning who support them. Meanwhile, Chingola Municipal council has fifteen officers. However, participants from both municipalities did not indicated how many of public officers are provided under the institutions' establishments. Further as could be seen from the data reviewed, there are primarily two departments focusing on environmental management in the Municipalities and these are Public Health department and planning department.

d) Existing Legislation on Environmental Protection

The theme was developed from the interview question number six (What are existing Laws/Regulations enforceable by your institution to promote environmental protection in the

Country? Also state the enforcement procedures). This interview question was significant as it helped in answering research question two. The participants from ZEMA responded that the principal Act under which the institution was formed and from which its mandate are enshrined is The Environmental Management Act No. 12 of 2011 and its subsidiary Legislation. They further indicated that there exist other regulations supporting the principal Act. These regulations include among others the Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations, Statutory Instrument No. 28 of 1997; Environmental Management (Licensing) Regulations, Statutory Instrument No. 112 of 2013; the Environmental Management (Extended Producer Responsibility) Regulation Statutory Instrument No.65 of 2018, and.Environmental Management/Environmental Assessment (SEA) 48 of 2021. Enforcement is done by using the guidelines developed through regulations and later followed up through routine inspections and monitoring.

The mining sector in Zambia is governed by a multitude of mining and environmental laws, under which the mandated institutional and governance arrangements for environmental monitoring, auditing and enforcement are established and responsibilities spelt out. The participant from MSD indicated that the Mines and Mineral Development Act, 2015 is the principal Act regulating the mining sector. However, it is complemented by Mines and Minerals (Environmental) Regulations, 1997, Mines and Minerals (Environment Protection Fund) Regulations, 1998, Mines and Minerals Development (General) Regulations, 2016, Environment Management Act, 2011, Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations, 1997, Environmental Management (Licensing) Regulations, 2013, The Ionising Radiation Protection Act, 2005 and 2011 amendment, The Explosives Act, 1974.

On the other hand, the participants from the municipalities of Kabwe and Chingola districts showed existing legislation enforceable by the two institutions among others included: the Public Health Act, CAP 295 of the Laws of Zambia; Solid Waste Regulations and Management Act, Statutory Instrument No. 12 of 2018, Environmental Pollution and Control Act., Local, Government Act, Water Resources Management Act, 2011, and Statutory Instrument No.112 of 2013. The municipalities further explained that enforcement is done through monitoring and inspection to establish offenses, generation of compliance orders, inspection to verify

compliance, generation of non-compliance orders, and finally if the offenders are not abiding by the warning/orders, the cases are advanced to the courts of law for prosecution.

The analysis and review of the submissions from all the participants suggested that the final stage in the procedure of enforcing the law was prosecution by the courts of law. And further that despite the environmental damage existing, there are laws (though with gaps) in place which when enforcement is improved could lead to some improved degree of environmental compliance.

e) Frequency of Monitoring Routine and Punitive Measures for Non Compliance

The theme was generated from the interview questions number 6 (second part Enforcement Procedures), 7 and 9 where participants were asked to indicate the frequency at which their institutions conduct inspections and monitoring programs as well as to indicate the existing punitive measures they in case of non-compliance with corresponding procedures. These questions were meant to help me as a researcher to establish the capacity and effectiveness of the regulatory institutions. Participants from ZEMA indicated that monitoring is done twice in a year. Compliance monitoring done every after 6 months. However, there are some which are conducted as when need arises especially when complaints are received, which could even on a daily basis. In an event of non-compliance compliance, ZEMA as an institution issue orders served on offenders as first steps. Where the offenders demonstrate that they are unwilling to comply with orders issued, then the process of ligation is triggered with the courts of law. The timelines are always stipulated in the orders served depending on the gravity of the offense committed.

In the case of MSD, the participants indicated that over 220 inspections are set as departmental annual targets divided into quarters. However, due to erratic funding department carries out inspections/environmental audits as and when funding is received from the national treasury. There are also inspections that are spontaneously carried out when there are fatalities/accidents in the Mines or suspected unauthorized discharges or spillages to the environment by the mining companies. For non-compliant companies, punitive measures are meted against them. The participant indicated that the procedure followed for implementing punitive measures include writing to the company informing them of the particular offense committed and request them to

make good within a specified period of time and requested to show cause why punitive measures should not be taken against them. In case of a summary fine, and individual responsible for misconduct/wrong doing is written to informing him that compensation for the damage caused by his or her negligence will be deducted from the monthly pay which then goes to the national treasury. Fine raised against entities are remitted directly to the national treasury. In certain cases where danger is eminent, an order to close the mine or a section of the mine is issued. He further indicated that in cases where companies do not comply with the above mentioned steps, the department involve the local police officer in charge of what action (especially when operations are suspended) the department will have taken and request the police to man the premises until the matter is resolved. Finally, court litigations are initiated either through collaborations with ZEMA who would raise a court order and proceed with prosecution or the Attorney General's chambers to initiated the litigation.

As indicated by the participants from the municipalities of Kabwe and Chingola, both carry out routine inspections on a quarterly basis while other inspections are conducted as and when need arises. They further indicated that some inspections are triggered when complaints from the public are received and also upon renewal of compliance certificates and licences. However, the participants indicated that punitive measures are taken against the offenders depending on the type of offense committed. Measures taken include closure of premises. In certain case verbal warning - seven days' notice, written warning 14 – 21 days depending on the gravity of the offense, finally Court proceedings commenced if no compliance is attained.

Submission from all the participants indicated that they have both scheduled and unscheduled inspection and monitoring programs. Also that the final procedures in implementing punitive measures is prosecution by the Courts of law.

f) Execution Challenges

The theme was developed from the interview question number eight where participants were asked to state the challenges they face during enforcement. The interview question was important as it helped to answer the research question number four – "What recommendations based on best environmental practice could be made and adopted in order to strengthen legislation and institution capacity to regulate the mining sector so as to avoid future environmental liabilities".

Enforcement of the law comes with the challenges as could be seen from the responses received from all the participants.

The participants from all the institutions presented similar challenges which among others included the following:

- Inadequate funding and transport to effectively and efficiently activities (inspections, audits etc.);
- Low staffing levels under operations department;
- Inadequate equipment for members of staff when conducting inspections and audits;
- Public complaints on environmental pollution;
- Industries resisting entry into their premises for inspectors to carry out their mandate;
- Political interference where in certain instances inspectors are threatened while executing their duties/mandate; and
- Non-compliances by industries.

g) Collaborations Amongst Environmental Regulatory Institutions

The theme was developed from interview question number ten where respondents were asked to state or name the key departments/stakeholders they collaborate with during when executing their mandate and how they collaborate. This was important as it was helping in answering research question number 1 on the extent to which environmental stewardships is applied in the mining sector. Participants from ZEMA indicated that they collaborate with various stakeholders depending on the nature of the activity. They collaborate with government line Ministries - Local Government, Ministry of Health, Water Resources Management, the Energy Regulation Board, Ministry of Mines and Minerals Development, Academia, Interested and Affected persons, and departments in charge of water, energy, agriculture, including NGOs.

The participants from MSD indicated that the department collaborate with more with ZEMA. ZEMA send mining related Environmental Project Briefs (EPBs) and Environmental Impact Statement (EIS) to MSD for review. MSD inspects the sites proposed and give advice through

written comments before decisions letters are issued to project proponents by ZEMA. She further stressed that the other government departments they collaborate with included the Zambia Police, Ministry of Local Government through the local municipalities or town Councils. However, the collaboration with the local authorities is not well defined.

Participants from KMC indicated that they collaborate with the Ministry of Health, Ministry of Livestock and Veterinary Services, Ministry of Water Development, Ministry of Home Affairs and Internal Security, Ministry of Information and Media. The collaboration is done by holding meetings and planning together as well as executing the duties as a team. Meanwhile participants from CMC showed that they collaborate with ZEMA, legal Department, the community and community radio stations, State police and Public prosecutor and the Judiciary.

The submissions from the two municipalities demonstrated that there is a collaboration gap between the municipalities and the Ministry of Mines and Minerals development.

4.2.2 Category Two Participant

Category two participants were selected from among companies or departments likely to be affected by mining activities. These included service providers – water utility companies and forestry department. The rationale for selecting this category to participate in the research was for purposes of eliminating biases and also to help in addressing the first and second specific objectives of the research. To select participants, formal letters were written to the head of department Forestry and also to the Managing Directors of the selected water utility companies. Arising from that, the institution/companies assigned using their discretion participants to support my research. A total number of five interview questions were asked to all the participants at of which themes were generated and used for the analysis as follows:

a) Legislation Governing the Operations and Corresponding Role in its Implementation

The theme was derived from the first and second interview questions “What existing environmental policy/legislations (for example Acts of Parliament, Statutory Instruments etc.) govern your operations and the role played by your institution in its implementation?” The question was intended to establish how knowledgeable the institutions are on environmental legislation governing and protecting them as identified key stakeholders. The stakeholders in this category where selected on the premise that they are prone to be affected by mining activities

easily and that may interrupt the services that they render to the community in general. The participant from the department of Forestry indicated that as an institution, the legislation governing the operations of the department include among others - Forestry Act No. 04 of 2015, Zambia Wildlife Act No. 12 of 1998, Water Resources Management Act No. 21 of 2011, the Lands Acquisition Act No. 2 of 1970, National Heritage and Conservation Commission Act 1989 and The Environmental Management Act, 2011. The Forestry Act is the core piece of legislation the department of Forestry administers as it provides for the conservation and use of forests and trees for sustainable management of forests ecosystems and biological diversity and also provides for the implementation of UN Framework conservation on climate change. The participant further indicated that the role the department plays was to interpret the Forestry Act in the management and utilization of forest resources and ecosystems as it is read together with other environmental legislation listed above.

Participant from Lusaka Water and Sanitation Company (LWSC) indicated that as a company they developed an Environmental Safeguards Policy. The policy was among others guided by Environmental Management Act 12 (2011), Environmental Management Assessment Regulations (1997) and the Environmental Management (Licensing Regulations (2013) SI N0. 112 of 2013 to ensure conformity with the national legislation. The participant from LWSC indicated that as a company their major role is to supply portable water and provide sanitation services to avoid water body's contamination. However, they are aware of water pollutions due to mining activities which normally cause difficulties in treating the water for it to be safe for drinking. In such cases, the company normally engages ZEMA on any water body's pollution due to mining activities.

On the contrary there was no response on the subject matter regarding existing environmental laws or policies governing their operations from Lukanga water and Sanitation Company. Conversely, the participant mentioned that as an institution they ensure adherence and compliance to environmental laws and policies in their day to day operations and strive to operate within the national laws and maintain good environmental stewardships.

b) Effects of Mining Activities on Operations

The theme was derived from the third question "How do mining activities impact and/or likely to impact on your operations?" The question was meant to establish how much influence the impact of mining activities on the environment could have on other sectors in the society. The feedback of the participant from Forestry department suggest that mining rights supersedes forestry conservation rights. This means that forestry despite the ecosystem service they provide, mining activities take up an upper hand as a result of negative policy interaction between mining policy and forestry policy or Act.

Participants from the water utility companies bemoaned that mining activities affect the ground water table (which is the major source of water) there by changing its composition and this results into increased costs of treating the water to the point of being safe for drinking. They further indicated that mining activities also pollute surface water as it is more susceptible compared to ground water. The result of water pollution is increased treatment cost. Water is essential to life on our planet earth. True to the sentiments made by the two participant from the water utility company, mining affects fresh water through heavy use of water in processing ore, and through water pollution from discharged mine effluent and seepage from tailings and waste rock impoundments, including insitu leaching. A practice where a strong acid is pumped into a virgin rock and is pumped out as pregnant solution where mineral are recovered through electro - winning process.

c) Efficacy of Existing Environmental Legislation and Institutions

The theme was formulated from the interview questions which focused on the participant's views on whether or not the existing environmental legislation and the corresponding institutions were sufficient and carrying out the dues effectively, and provide suggestions on what could be done differently to improve environmental governance and compliance especially in the mining sector. These questions were very important as they will help in answering research question number 3 and 4. A participant from the department of forestry indicated that the current existing piece of legislation on environmental protection was sufficient. However, to improve on compliance, there was need for the government to regularly conduct environmental audits, formulate environmental compliance committee, build capacity in responsible institutions such

as MSD and ZEMA in regular safety health and environmental quality (SHEQ), environmental management and protection conforming to ISO 14001, and prepare baseline data on environment and protection for use when setting SHEQ. He further emphasized that Contractors in the sector are inducted and trained/educated on the importance of environmental compliance and management.

Participant from Lukanga water expressed doubt on the efficacy of the current environmental legislation due to current cases of pollutions saying that a number of water bodies are contaminated using the Kafue River as an example where fish died as a result of acid discharged by the mines. He further indicated that punitive measures towards law breakers must be initiated that would prevent who would be offenders in future and that there is need to put in place real time environmental monitoring techniques. It is clear from the submission that there is need to build capacity in regulatory institutions. Meanwhile the participant from Lusaka water categorically stated that the current environmental legislation was sufficient and that greatest challenge lays with implementation to ensure adherence. To support enforcement, he recommended that integrated system on economic development and environmental protection should be taken. The two participants from the water utility companies seem to be of the view that there was need to introduce stiffer punish and increase capacity in regulatory institutions by among others buying equipment that would enhance monitoring results.

4.2.3 Category Three Participant

This category as stated in Chapter Four consists of participant living in communities where mining activities are either taking place now or took place during the time of ZCCM and have had adverse environmental impact in these areas. In the 2022 Guide to Enhance Digital Engagement, "How to Become an Expert in Inclusive Engagement", Socialpinpoint stated that "The diversity of opinions and voices in our communities can help society face today's biggest challenges and come up with innovative, future-focused solutions". (Socialpinpoint, 2022). The research considered the likely affected communities as key stakeholders and that their feedback would help in eliminating certain biases. With the help and support of the official from the local municipalities, deemed local community leaders (ward development committee (WDC) members and area councilors) were identified to be participants in my research. The rationale was that as

leaders they represent communities and had a good understanding of the local environment and social aspects in their areas.

To guide the interview, five open ended questions were formulated out of which themes were derived and that helped with the analysis of participants' responses as follows:

a) Impacts of Mining Activities to the Local Communities

The theme was derived from the interview which bordered on what impacts (especially adverse ones) mining operations (both large and small scale) have had in their local communities and to share some of the environmental concerns affecting them. This interview question was intended to help in answering the research question number 1 "To what extent are environmental stewardships applied in the Mining sector in Zambia" obviously by the institutions entrusted with the mandate. The responses from most participants acknowledged that mining activities have had direct and significant environmental (on soil, water and air) and social impacts on their respective environment. On the contrary, a participant from Kasompe community of Chingola district indicated that impacts arising from disposal of waste (tails from metallurgical processes) through the pipelines had potential of polluting the environment with acidic waste. Participants from Nchanga North area of Chingola district indicated that mining activities pollute the air obviously through dust and stack emissions from mineral processing plant and that affects the health of the community.

Kabwe district is well known for lead pollution which resulted from mining operations at the time when the Lead/Zinc Mine was active. The two participants from the communities of Makululu and Katondo indicated that mining of lead in Kabwe resulted into lead pollution of air, soil and water in their communities. Participant from Makululu community indicated that those who are adversely affected by lead (having elevated Pb levels in blood) have and exhibit seriously health challenges which include poor IQ in children whereas in adults lead poisoning leads to infertility and poor memory. The participant from Katondo community expressed concern of the current unregulated disposal lead bearing waste (effluent) into the canal where it gets concentrated, hence attract illegal mining who dig and collect the material and eventually disturb the profile of the canal which becomes a menace and prone to flooding. The canal is a

key environmental infrastructure in Kabwe which acts as a conduit for collection of lead contaminated effluent from the lead contaminated hotspot areas in Kabwe.

The presence of pollutants which escaped from the mining/plant areas into the environment is an indication of weak administration of the environmental legislation by the mandated government institutions.

b) Knowledge of Environmental Legislation Governing the Mining Sector

The theme was derived from a set of second interview questions (What environmental legislation, for example Acts Parliament, Statutory Instruments do you know govern the mining sector in Zambia? What is the role of the community in its implementation?). These questions were pertinent as they were meant to help me as a researcher to establish if the communities were aware of the privilege bestowed on them by law of participating in decision making at project design stages when it comes to project development taking place within their communities. The communities are key stakeholders in project taking place in their locality and they are supposed to be involved as early as at project design through the processes of among others preparing safeguard tools such as environmental and social impact assessments or environmental project briefs including environmental checklists. It is the responsibility of ZEMA to ensure the views of the community are taken on board before issuing decision letters for the project to proceed.

Two participants from the communities of Nchanga North and Kasompe both of Chingola district indicated that they were not aware of any environmental legislation governing the mining sector in Zambia and that made it impossible for them to know their roles as community members in project implementation taking place in their areas.

On the other hand, participants from Makululu and Katondo communities of Kabwe districts demonstrated some level of understanding on the environmental legislation governing the mining sector. They both indicated that the local authorities where the projects operate have the mandate to make By-laws and use them to regulate the activities taking place within the areas of their jurisdictions. The participant from Makululu community acknowledged that there exists guidelines provided by the Ministry of Mines which regulate the extractive industry and also the Environmental Management Act and accompanying regulations guide investors who engage in

mining business. Meanwhile, a participant from Katondo community cited the Public Health Act and the Occupation Health and Safety are used to govern the mining sector alongside other relevant legislation.

On the roles of the communities, the participant from Makululu indicated that it is insignificant due to poor or inadequate information whereas, a participant from Katondo community indicated that the role of the community was to establish community-led deterrent activities based on local economic development as well as foster sustainable local development.

c) Adequacy of Existing Environmental Laws

The theme was generated from the fourth interview questions in this category meant to establish if the existing environmental laws governing the mining sector was sufficient to protect the environment in the mining towns/areas. The question was important as it was going to help in answering research question number three – weaknesses or gups existing in the current environmental legislation. ChangeLab Solutions, in their publication "**Inclusive Community Engagement & Equitable Participation to Improve 4 Core Functions of Local Government"** stated that Democracy requires public participation and community engagement to engender a government "of the people, by the people, for the people and that Local governments have a responsibility to engage their community members in a robust and equitable manner in order to effectively carry out the key functions of government, such as crafting and implementing laws, budgets, plans, directives, and strategic visions (Katie Hannon Michel, 2018). Community engagement is key if a piece of legislation which is going to stand a test of time is to be realized.

An analysis of the responses from all the participants in this category indicated prima facie that the existing legislation was sufficient and that community sensitization and education awareness are undertaken and improved. The participant from Makululu Township further indicated that the current legislation could be sufficient especially if adherence can be enforced and monitoring by environmental regulatory institution such as ZEMA, Ministry of Mines and Local Municipalities are enhanced. Also relevant NGOs such as Human Rights Watch take up the oversight role in environmental regulation. The participant from Katondo Township stressed that the community-led initiatives and participation in tandem with the legislation should be

optimized. The recommendation from the submissions is pointing to education and awareness and community sensitization of the pieces of legislations.

d) Capacity of Environmental Regulatory Institutions

The theme was derived from the last interview question which was aimed at getting the community perception on whether the mandated environmental regulatory institutions (ZEMA, MSD, local authorities etc.) were doing enough to protect the environment. The question was relevant as it helps in answering research question number 2. The perception the community have or/and might have of how regulatory institutions are execute their mandate will affect the way others view them.

The two community participants from Nchanga North and Kasompe townships both of Chingola district gave indications that they were not aware of such institutions other than the council responsible for environmental protection. On the other hand, community representatives from Makululu and Katondo townships both of Kabwe districts were aware of the institutions, however, they were not doing enough to enforce measures meant to protect the environment. A participant from Makululu further stressed that non-compliant companies could be thriving on the fact that punitive measures are not enough and strong to discourage future offenders.

The two key institutions (ZEMA and MSD) responsible for environmental regulation in the mining sector in Zambia do not have representations in the districts of Chingola and Kabwe.

4.3 Chapter Summary

From the analysis and interpretation of the data, it is clear that there are gaps and weaknesses existing in the Zambian legislation. Outstanding, was the mine closure plan. Much as it is a statutory requirement for Zambia, just as it is for Australia and India, the weakness with Zambia is that it is a conceptual plan prepared at pre-project stage. On the contrary, for India and Australia, mine closure plans are prepared in detail as per guidelines and are updated frequently. On the enforcement procedure, Zambia does not have a dedicated court to fast track environmental related case. Feedback from the interviews conducted with the participant, it is clear that:

- There is poor or no collaborations among the institutions responsible for environmental protection;
- Existing environmental (2007) and the mining (2013) policies and other environmental legislation do not effectively respond to the aspirations of the people;
- Institutions responsible for enforcement of the law are under staffed, underfunded, and lack transport to conduct field visits;
- Community knowledge on various pieces of environmental legislation governing the mining sector, and their responsibilities in any project taking place within the local community was very low.

CHAPTER FIVE: DISCUSION

5.0 Introduction

Considering the resources the Republic of Zambia is devoting through loans (for example the Copperbelt Environmental Project, Zambia Mining Environmental Remediation and Improvement project and so on) toward environmental rehabilitation and clean up as a result of mining activities, it was important that a study was conducted to assess the efficacy of environmental legislation in the mining sector of Zambia. The study employed two types of study designs; case study and phenomenological study.

In the case study, an in-depth understanding of how environmental laws and related legislation in the jurisdictions of the Republic of India and Australia ensure environmental protection or environmental sustainable development in the mining sector was conducted while making comparisons with the Zambian jurisdiction. The rationale was to help the researcher to identify possible weaknesses or gaps in the Zambian legislation and learn best practices which could be domesticated so as to strengthen environmental legislation. Thus addressing specific objective number three.

On the other hand, a phenomenological study design was used with the recruitment of a total number of sixteen participants who were then categorized into three groups as elucidated in chapter five. A phenomenological study was employed in order to address specific objectives one and two to a large extent. This chapter is therefore aimed at summarizing the interpretation and findings of the study, demonstrates how the research questions were answered, and gives the overall conclusion of the study.

5.1 Discussion

The effects of Mining activities on the environment cannot be over emphasized. The adverse effects on the environment include inter alia loss of biodiversity, soil erosion, contamination of surface and ground water. It has also the potential of triggering the formation of sinkhole, surface subsidence – worst effects of mining activities on environment.

Mining companies in Zambia have continued to pollute the environment, contributing to the already existing environmental legacy liabilities. However, there exist environmental legislation

meant to ensure polluters shoulder the responsibilities and ensure environmentally sound mining practice take effect. Despite the existing of legislation, pollution by mining companies has continued.

The study endeavored to address the four specific objectives of the research by answering four research questions developed from the specific objectives. The specific objectives number three and four were addressed primarily through a case studies whereas specific objectives one and two were addressed to a large extent through a phenomenological study as demonstrated in the proceeding sub-sections.

5.1.1 Summary of Case Studies

The case studies conducted in the jurisdictions of Australia and India helped in addressing the specific objectives number three and four of the study which were identification of weaknesses/gaps existing in the current legislation and make recommendations (taking also into account good international practices). From the data interpretation and results of the study, it can be clearly seen that the specific research objective number three and the research questions three and four were successfully addressed. In the Case study analysis, Benchmarks of Good Environmental Standards for Mine Closure were considered and that helped to identify some of the existing gaps. Four critical parameters were used in benchmarking and these included Mine closure planning, institutional and governance arrangements, procedures and pre-conditions necessary to return land to the state after closure, and frameworks for Post-closure Land Stewardship and Monitoring.

The gaps identified range from weaknesses in existing legislation, governing institutional arrangement to funding. As observed in chapters two (literature review) and four (data collection), legislation governing the mining sector in Zambia exist. However, it is marred with a number of weaknesses as this was seen when comparisons with the jurisdictions of Australia and India were made in chapter four (Results) of this study. While mine closure is a statutory requirement in Zambia, it is only a conceptual plan prepared at pre-project stage whereas in Australia and India are prepared in details and as per guideline the law dictates that mine closure plans are revised preferably every 3 years. In Zambia there are no proper mine closure guidelines

that exist. The Mines and Minerals Development Act as well as the Environmental Management Act contain section that are not operational and have not been implemented for over eight years now due lack of clarity.

Lack of inspections, monitoring and enforcement still remain a major challenge. This mostly is as a result of lack of availability of resources to support these activities. There exist directions for monitoring the implementation status of inter alia the approved progressive rehabilitation and mine closure plan by the regulatory authority. However, in the absence of funding it becomes a nightmare.

Non operationalization and non-clear guidelines of both the Environmental Protection Fund (EPF) and the Environmental Permanent Fund as provided for under the Mines and Minerals Development Act of 2015 and the Environmental Management Act of 2011 respectively, have continued to cost the government. The funds secured through EPF and environmental protection fund are supposed to be used to rehabilitate the environment as they are treated as sureties.

The existence of policy and law in any sector require that good institution/governance arrangements are in place to ensure smooth implementation and enforcement. The implementation weaknesses identified among others are due to centralization and poor staffing levels. Mines Safety Department is only found in Kitwe despite having a country wide mandate of ensuring the health and safety of the environment and workers in the mines. The two institutions are operating below 70 % staffing level as demonstrated in chapter four. The institutional structures in both institution still remain unchanged despite the massive industrial development dynamics experienced in the last two decades; lack of dedicated Tribunal (Court) specialized in environmental related cases as observed in the case of Australia and India where Green Courts exist and handle with speedy matters pertaining to environmental protection; and also lack of political will. The interviews conducted revealed that most of illegal miners were being supported by some senior government officials and also official from the ruling political party of the day. Inspectors receive threats during the execution of their official duties. Yet the environmental footprint created by illegal miners are a serious concern and a threat to the environment.

Further, the other gaps identified rests on unclear system of monitoring and managing the land and remaining buildings/facilities after closure and Abandonment by the developer, although it is a requirement under Environmental Regulation, 1997 that the cost of post closure monitoring or management be calculated. However, the implementation mechanism is not defined since the land is returned to the owner after closure or can be leased to the new lessee or even the operation continued after expiry/ revocation of previous lease by decision of Director, till new lessee is found. Only a few mining companies adhere to the calculations and committed to protect the environment in their environmental and social impact assessment. Pumwani Copper Mines is one of mining companies who have incorporated this aspect in their ESIA. Compliance status of the small-scale is still a challenge. There is urgent need to revise the Environmental Protection Fund (EPF) regulations to also capture small scale mines and exploration operation. This is very important as it is the only surety for environmental protection in Zambia's mining sector.

5.1.2 Summary of Phenomenological Study

To address specific objectives one and two which were to analyze the extent to which environmental laws are applied in Zambia's mining sector and secondly to assess the capacity of the institutions responsible for the implementation of existing environmental legislation and its enforcement procedures, a phenomenological study was conducted. A total number of sixteen people (adults) participated in this study. The participants were further categorized into three (3) groups as:

- Category one consisted of Environmental regulatory institutions;
- Category two had service providers; and
- Category three was constituted by the community representatives.

A set of interview questions specific to each category were carefully developed while focusing on the main objectives and as well as the four research questions for the study. Responses to questions in category one participants demonstrated that there are existing environmental which are not being implemented to the fullest possible due to among others not fully utilizing the established structure in key environmental regulatory institutions by employing inspectors to fill

up the missing positions, lack of adequate funding to support environmental monitoring audits and inspections by the Central Government, lack of sensitizations to the local politicians in order to help them understand the policy direction which they might have formulated of inherited. This will greatly minimise or mitigate political interference which can be the biggest issue (Desai, 2016) among law enforcers if left unchecked. Further, the departments/agencies in charge of environmental monitoring are unable to reach and effectively carry out monitoring and inspections to all the places where mining activities are taking place due to insufficient transportation and mobile field monitoring equipment. As a result of that, mining and mineral processing companies whose focus is on profit making take advance and eventually pollute the environment well knowing that the regulators are not present on the ground. Collaboration among environmental regulatory institutions still remains a challenge: Much as there is some level of collaboration between MSD and ZEMA in the manner in which they handle EPBs and EIAs on mining and minerals processing project, the submissions from the two municipalities of Kabwe and Chingola districts demonstrated that there is collaboration gap especially with the Ministry of Mines and Minerals development. The issues associated with collaboration gaps among/or between institutions include duplication and conflicts of responsibilities and to some extent inefficient resource allocation.

To improve on the compliance levels on environmental protection, education and awareness on the pieces of environmental legislation is very critical to those being regulated. As was demonstrated by one of the participants in category two that he was not very familiar or aware of the laws governing their operations, it is important that deliberate sensitization programs are frequently conducted through among others road shows, focused group discussions, radio programs and taking advantage of investment promotion events such as Agriculture and Mining Shows, International Trade Fair and so on. Once the regulated are aware of their obligations as provided for under the law, it would be easy for them to domesticate (localize) and tailor them to their respective needs and develop institutional “DOs and DON’Ts “. Compliance is likely to be enhanced if the regulated category is aware of what is required of them, including the punitive measures from the law. Further, if they notice that mining and mineral processing companies are undertaking activities likely negatively impact the environment, they will be able to report to ZEMA and MSD. It was clear from the data interpretation that the efficacy of the current

environmental law is questionable. Much as there are environmental laws in place, there are lapses in enforcement as indicated in the preceding paragraphs which are evidenced by environmental pollution taking place in various mining towns. For example, the discharge of pollutants into the Kafue River which left species of fish dead as was observed in the submission made by a participant from Lukanga Water. There could be certain companies who would be more inclined to deliberately discharge pollutants into the environment with the view of paying the fine. To prevent this behavior, it is important that the punitive measures taken are inhibitive and prohibitive to potential offenders – increase the fine (penalty charges) in case of corporate entities and imprisonment sentence for individuals responsible.

The community where mining activities are and were taking place, were able to point out the negative environmental impacts mining activities have had in their communities. Negative impacts included water pollutions in various streams connecting the Kafue River, air pollution (through lead bearing dust especially in Kabwe where small scale mining and stack emissions from mineral processing are on the rise), land pollution with heavy metals such as lead and cadmium. All these impacts have resulted in health challenges among the communities leaving them wondering if there is a government in place. The presence of pollutants which escaped and continues to escape from the mining/plant areas into the environment is an indication of weak administration of the environmental legislation by the mandated government institutions. It is therefore important that ZEMA and MSD take up an active role in ensuring that necessary measures are taken into account, and the communities are educated on what the law requires of them as stakeholders in the projects taking place in their respective areas so as to promote community participation. There is need to sensitise the community on various pieces of legislation applicable to environmental protections, where to go and how to report cases related to environmental pollutions. Analysis of responses from communities on the capacity of environmental regulatory institution indicated that they were not aware of ZEMA as well as MSD, yet these are the two key institutions with a leading oversight on environmental protection in the mining sector of Zambia.

History has shown that in the absence of policy there can be lasting economic, environmental and social costs, especially for local communities, including women, who are often most vulnerable to the consequences of a mine closure. This has been demonstrated by what is

currently pertaining in Kabwe District of Zambia, where the Government and the Communities are putting efforts together in order to clean up lead pollution in the environment and also launched blood lead treatment health campaign. Poor policy which is not in line with the best international practices can have unintended consequences, such as stifling innovative solutions, or discouraging well-managed mining projects that can bring benefits such as investment and economic development.

CHAPTER SIX: CONCLUSION AND RECOMMENDATION

6.1 Conclusion

Pollution from the mining and mineral processing companies still remain a source of concern to both the environment and human health living in mining Districts. It was therefore important that a study to establish the efficacy of environmental laws governing the mining sector in Zambia was conducted with the view of understanding the extent to which environmental laws are applied, adherence or compliance levels, identify shortcomings or gaps in the laws, and finally make recommendations to help the policy makers and other stakeholders with the oversight of environmental protection to better manage the industry.

The study was successfully conducted and all the four specific objectives were met. Specific objectives number one and two "To analyse the extent to which environmental laws are applied in the mining sector" and "Assess the capacity of the institutions responsible for the implementation of the existing environmental legislation in the mining sector and its enforcement procedures" respectively were addressed using the phenomenological study. From the findings of the phenomenological study it was clear that pollution had continued taking place from the mining and mineral processing industries. Companies discharging pollutants into the environment such as Kafue River, heavy metal bearing dust as well as stack emission resulting in serious health exposure to the communities living in mining areas. From the study conducted, the continued pollution was as a result of among others:

- Leading institutions in environmental protection with country wide mandate in the mining sector of Zambia, MSD and ZEMA not being decentralised. For example, MSD is only found in Kitwe District despite the fact that mining activities are taking place beyond the boundaries of the Copperbelt province. ZEMA does not have presence in other key mining towns such as Kabwe district. That makes it impossible for government to monitor and oversee mining activities in all parts of the country in a timely manner;
- MSD and ZEMA operating below established departmental/agency staff levels;

- Inadequate and erratic funding resulting in limited environmental monitoring and inspections by the departments. MSD and ZEMA fail to conduct even the scheduled audits as required by the law;
- Lack of modern field monitoring portable equipment. This affects real time inspections;
- Lack of collaborations between and among regulatory institutions especially with the local authorities;
- Political interference where inspectors in certain instances are threatened by political leaders;
- Lack of local community sensitisation on the proponents' obligations when it comes to environmental protection. No whistle blowing as the majority of the local communities are either not aware of their right to clean environment or do not know where to report cases or both;
- Final procedures in implementing punitive measures is prosecution by the Courts of law. However, the processes takes long and that may be discouraging to the enforcers; and
- Obsolete policies: Environmental Policy (2007) and Mineral Resource Development policy (2013) making it difficult to respond to emerging issues.

On the other hand, specific objectives numbers three and four "Identify the weaknesses and gaps existing in the current legislation" and "Make recommendations based on the best practice in the World to strengthen and/or fill up the gaps" respectively were primarily addressed by applying a case study for benchmarking purpose with Australia and India. Good environmental standards for mine closure were considered and that helped in identifying some of the existing gaps or weaknesses. Recommendations were then made as elucidated in Section 6.2 of this chapter. The gaps identified in the study included the following:

- Mine closure plan is an issue integral to mine planning which should be incorporated from the early stages. Although it is a statutory requirement, it is just a conceptual plan prepared at pre-project stage whereas Australia and India compel mining operators to prepare detailed mine closure plans which are regularly reviewed by specialist department/agencies;

- No formal separate mine closure guidelines available in Zambia. Australia, as revised in March 2020, has Statutory Guideline for mine closure plan while Indian guidelines are always prescribed separately by specialized IBM and MoC;
- Lack of specialized systems such as Green Court arrangement as the case is in both India and Australia; and
- EPF contribution to GRZ only sure security for environmental liabilities. However, EPF is non-operational and there are no clear guidelines on the governance of both environmental protection fund and environmental permanent fund. Conversely, in the comparative jurisdiction, financial institutions providing UPB are liable even when the company becomes bankrupt.

It can safely be said that continued pollution taking place in the mining sector in Zambia is no doubt linked to weak or indeed inadequate environmental legislative framework as noted above as well as weak institutions of enforcement coupled by lack of inspections, monitoring and enforcement by mandated institutions largely MSD and ZEMA. The Country can learn and implement good practice standards from both Australia and India in order to bride the identified existing gaps/weaknesses and prepare for any future environmental liabilities such as acid mine drainage. The study further, revealed that despite having been a mining Country for about 100 years, Zambia has not successfully closed any mine.

6.2 Recommendations

The current inefficiencies in mine closure planning and mining legislation illustrates the need for an integrated approach to mine closure and improved mining legislation requirements. Legislation and mine closure requirements must not only focus on economic consideration, but also incorporate the social and environmental issues within the overall mine site operations, closure and completion practice.

For any law to be implemented, there is need to have institutional arrangement in place that are well organized, with clear mandate, capacitated with qualified staff, as well as resources to enable them function efficiently and effectively. All mines have a finite life span. The research has helped us to see that legislation governing environmental related issues in Zambian mining sector exist but that it is not adequate compared to what subsists in the jurisdictions of Australia

and India. The weaknesses observed mostly bordered on lack of mines closure guides, non-operationalised provision of the Mines and Minerals Development Act and the Environmental Management Act which provide for the engagement of honorary inspectors with the view of beefing-up support to these institutions. The rationale for introducing these provisions in the Acts was basically to complement the staff in inspections and monitoring the environment in the mining sector inter alia. Further, it is clear that the regulatory authorities are under staffed and are operating based on the old established structures which have not been revised for over two decades despite increased demand for services dictated by rampant economic development. It is also noted that lack of inspections, monitoring and enforcement triggered by inadequate or lack of resources has the potential to contribute to non-compliance to environmental regulations. Hence the need for government to move in and help the regulatory institutions take care of the above concerns.

Also, early identification of risks associated with closure allows possible impacts to be avoided or mitigated in a timely manner, which ultimately reduces the closure liabilities and improves post closure benefits. A clear, effective mine closure framework will help protect the environment and interests of the community, and will also encourage the benefits that are brought by investment and development of mining opportunities.

Mine closure should be a process, and the design of mining projects should incorporate design for closure from the outset, with the closure aspect reviewed and approved by the appropriate regulatory authority. Appropriate closure can result in mines becoming engines for development beyond their own life, through a process that minimizes adverse impacts and maximizes after-use benefits in the long term.

. There is therefore great need to learn the best practice from India and Australia in order to develop clear mine closure guidelines which should also focus on post closure monitoring. Most of the large-scale underground mines on the Copperbelt Province of Zambia are now mining in the fringes, extending to the depth in excess of two kilometres hence making the cost of production high. The connotation of this scenario/situation is that in the next few years, mining companies will start operating at break-even point and eventually close down.

In summarising the study, the following recommendations were made:

a) Revise the current environmental policy and Mines and Minerals Development policy as well as the current Mines and Minerals Environmental Regulations and Environmental Impact Assess regulations in order to address gaps that have contributed to existing anomalies. The regulations should have a clear system of monitoring the environment post mine closure;

b) Establishment through an Act of Parliament of a special tribunal to handle the expeditious disposal of the cases pertaining to environmental issues. Speedy prosecution of offenders by a specialized (green) court will result in increased compliance;

c) The development of separate mine closure guidelines. This we can learn from Australia and India for it would equip the Country for future sound closure of mines;

d) To revise the Environmental Protection Fund regulations that will compel in a systematic manner and ensure all mining companies including small scale comply with the contribution requirements as it is the only surety for environmental protection;

e) The institutional establishment at both ZEMA and MSD are revised urgently if we as a country are to meet increased demand for services triggered by Zambia's growing economy. The revision should include decentralisation to ensure that the two regulatory institutions have presence especially in districts where mining activities are taking place. That will enhance inspections, monitoring and enforcement which would ultimately result in improved compliance;

f) Build capacity in environmental regulatory institutions in regular safety health and environmental quality (SHEQ), environmental management and protection conforming to ISO 14001, and prepare baseline data on environment and protection for use when setting SHEQ. And also procure field monitoring equipment;

g) The operationalization of sections in both the Mines and Minerals Development Act and the Zambia Environmental Management Act providing for engagement of Honorary Inspectors as discussed in chapter 5 to complement MSD and ZEMA in carrying out inspections, monitoring and enforcement;

h) There should be retention of a certain percentage of the resources ZEMA and MSD generates to enable their efficient and smooth operations;

i) It is recommended that the mining regulations are revised to ensure that the framework tackles post mine closure land stewardship and monitoring. By properly designing the means to address the environmental aspects of closure process and post-closure situation, mining companies greatly help social sustainability of the community after mine closure. Aspects of mine closure monitoring to include costs, how long, who pays, who enforces compliance;

j) Proper arrangements are in place to ensure the enforcement of the polluter pays principle is applied;

k) Increased collaborations among environmental regulatory institutions - MSD, ZEMA and the local municipalities as doing so will result in better coordination, avoid duplication of duties, efficient resource allocation and ultimately improved compliance; and

l) Community outreach to ensure education and awareness of the environmental legislation governing the mining sector, role of the communities in the projects to be implemented in their communities.

Implementation of the above highlighted recommendations especially in totality would significantly contribute to improved environmental management system in Zambia's mining sector.

REFERENCES

APEC, M. T. F., 2018. *MINE CLOSURE: Checklist for Governments.* Singapore: ASIA: Pacisfic Economic Cooperation..

Australia, G. O. W., 2020. *https://www.legislation.wa.gov.au/.* [Online]
[Accessed 4 March 2021].

Authority, W. A. E. P., n.d. *www.epa.wa.gov.au.* [Online]
[Accessed 4 March 2021].

Cresswell, J. W., 2003. *Research Design: Qualitative, Quantitative and Mixed Methods Approach.* Second Edition ed. Thousand Oaks, CA: Sage.

Cresswell, J. W., 2003. *Research Design: Qualitative, Quantitative and Mixed Methods Approach.* Second Edition ed. Thousand Oaks, CA: Sage.

Crisil, 2020. *Final report on Component 3: Governance and Institutional Arrangement,* Lusaka: ZMERIP - MMMD.

Dawson, A., 2019. A Practical Guide to Performance Improvement: Data Collection and Analysis. *AORN JOURNAL.*

Desai, R. B., 2016. *https://www.thehindu.com/news/national.* [Online]
[Accessed 22 June 2022].

GGIM, U., 2017. *https://ggim.un.org/ggim. [Online]*. [Online]
[Accessed 26 June 2022].

GRZ, 2013, *Mineral Resources Development Policy.* Lusaka: Ministry of Mines and Minerals Development.

ICMM, 2019. . *Intergrated Mine Closure: Good Practice Guide.* Second Edition ed. London: International Council on Mining and Metals.

India, G. o. t. R. o., 2021. *www.coal.nic.in.* [Online]
[Accessed 4 April 2022].

India, M. o. M. o. t. G. o., 2016. *E-Book on Mining Sector,* New Delhi: Ministry of Mines.

Institute, A. L. I., 2020. *www.austlii.edu.au.* [Online]
[Accessed 4 April 2020].

Institute, A. L. I., 2021. *http://www.austlii.edu.au/.* [Online]
[Accessed 5 June 2022].

Katie Hannon Michel, C. D. L. V. &. T. Y., 2018. *http:/medium.com/changelab-solutions/equitable-community-engagement.* [Online]
[Accessed 21 June 2022].

Leedy, P. &. O. J., 2001.. *Practical Research: Planning and Design.*. Seventh Edition ed. N.J.: Merril Prentice Hall..

Maxwell, J. A., 2013. *Qualitative Research Design: An Interactive Approach.*. Thousand Oaks, Califonia: Sage Publication.

India (2019), *Annual Report,* New Delhi: Indian Ministry of Mines.

MMMD, 2018. *https://www.mmmd.gov.zm.* [Online]
[Accessed 4 April 2022].

PowerDMS, 2020. *Future of Policy & Compliance Management,* Orlando, Florida: NEOGOV.

Salkind, N. J., 2006. *Exploring Research.* 6th Edition ed. Pennsylvania State: Prentice Hall,.

SCHL, C., 2018. *https://www.cmhc-schl.gc.ca/en/professionals/industry-innovation-and-leadership.* [Online]
[Accessed 26 June 2022].

Socialpinpoint, 2022. *https://insights.socialpinpoint.com/hubfs/How-To-Become-An-Expert-In-Inclusive-Engagement.* [Online]
[Accessed 10 June 2022].

Yin, R. K., 2014. *Case Study Research Design and Methods.* Fifth Edition ed. Thousand Oaks, CA: Sage Publications.

Zambia, N. A. o., 1997, 2011, 2015. *https://www.parliament.gov.zm/acts-of-parliament.* [Online]
[Accessed 13 January 2022].

LEGISLATION REFERED TO

Penal Code Act, Chapter 87 of the Laws of Zambia

Constitutional of Zambia (Amendment) Act, 2016

Environmental Management Act No. 12 of 2011

Environmental Protection and Pollution Control Act, , CAP 204

Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulation, 1997

Mines and Minerals Act (Environmental) Regulations, 1997

Mines and Minerals (Environmental Protection Fund) Regulations, 1997

Mines and Minerals Development Act No. 11 of 2015

Mineral Resources Development Policy, 2013

National Conservation Strategy (NCS), 1985

National Environmental Action Plan

Nation Policy on Environment, 2007

APPENDICES

Appendix 1: Ethical Clearance Letter

THE UNIVERSITY OF ZAMBIA

DIRECTORATE OF RESEARCH AND GRADUATE STUDIES

Great East Road Campus | P.O. Box 32379 | Lusaka 10101 | **Tel:** +260-290 258/291 777
Fax: (+260) 211 290 258/253 952 | **Email:** director.drgs@unza.zm | **Website:** www.unza.zm

APPROVAL OF STUDY

7th December, 2021

REF NO. NASREC-2021-NOV-009

Simukali Mulongwe
The University of Zambia
School of Engineering
Department of Civil and Environmental Engineering
P.O. Box 32379
LUSAKA

Dear Mr. Mulongwe,

RE: "EFFICACY OF THE ENVIRONMENTAL LAWS IN ZAMBIA'S MINING SECTOR"

Reference is made to your protocol dated as captioned above. NASREC resolved to approve this study and your participation as Principal Investigator for a period of one year.

Review Type	Ordinary Review	Approval No. NASREC-2021-NOV-009
Approval and Expiry Date	Approval Date: 7th December, 2021	Expiry Date: 6th December, 2022
Protocol Version and Date	Version - Nil.	6th December, 2022
Information Sheet, Consent Forms and Dates	• English.	To be provided
Consent form ID and Date	Version - Nil	To be provided
Recruitment Materials	Nil	Nil
Other Study Documents	Questionnaire.	

Specific conditions will apply to this approval. As Principal Investigator it is your responsibility to ensure that the contents of this letter are adhered to. If these are not adhered to, the approval may be suspended. Should the study be suspended, study sponsors and other regulatory authorities will be informed.

Conditions of Approval

- No participant may be involved in any study procedure prior to the study appeoval or after the expiration date.
- All unanticipated or Serious Adverse Events (SAEs) must be reported to NASREC within 5 days.
- All protocol modifications must be approved by NASREC prior to implementation unless they are intended to reduce risk (but must still be reported for approval). Modifications will include any change of investigator/s or site address.
- All protocol deviations must be reported to NASREC within 5 working days.
- All recruitment materials must be approved by NASREC prior to being used.
- Principal investigators are responsible for initiating Continuing Review proceedings. NASREC will only appeove a study for a period of 12 months.
- It is the responsibility of the PI to renew his/her ethics approval through a renewal application to NASREC.
- Where the PI desires to extend the study after expiry of the study period, documents for study extension must be received by NASREC at least 30 days before the expiry date. This is for the purpose of facilitating the review process. Documents received within 30 days after expiry will be labelled "late submissions" and will incur a penaltyfee of K500.00. No study shall be renewed whose documents are submitted for renewal 30 days after expiry of the certificate.
- Every 6 (six) months a progress report form supplied by The University of Zambia Natural and Applied Sciences Research Ethics Committee as an IRB must be filled in and submitted to us. There is a penalty of K500.00 for failure to submit the report.
- When closing a project, the PI is responsible for notifying, in writing or using the Research Ethics and Management Online (REMO),both NASREC
- and the National Health Research Authority (NHRA) when ethics certification is no longer required for a project.
- In order to close an approved study, a Closing Report must be submitted in writing or through the REMO system. A Closing Report should be filed when data collection has ended and the study team will no longer be using human participants or animals or secondary data or have any direct or indirect contact with the research participants or animals for the study.
- Filing a closing report (rather than just letting your approval lapse) is important as it assists NASREC in efficiently tracking and reporting on projects. Note that some funding agencies and sponsors require a notice of closure from the IRB which had approved the study and can only be generated after the Closing Report has been filed.
- A reprint of this letter shall be done at a fee.

- All protocol modifications must be approved by NASREC by way of an application for an amendment prior to implementation unless they are intended to reduce risk (but must still be reported for approval). Modifications will include any change of investigator/s or site address or methodology and methods. Many modifications entail minimal risk adjustments to a protocol and/or consent form and can be made on an Expedited basis (via the IRB Chair). Some examples are: format changes, correcting spelling errors, adding key personnel, minor changes to questionnaires, recruiting and changes, and so forth. Other, more substantive changes, especially those that may alter the risk-benefit ratio, may require Full Board review. In all cases, except where noted above regarding subject safety, any changes to any protocol document or procedure must first be approved by NASREC before they can be implemented.

Should you have any questions regarding anything indicated in this letter, please do not hesitate to get in touch with us at the above indicated address.

On behalf of NASREC, we would like to wish you all the success as you carry out your study.

Yours faithfully,

Dr. Mususu Kaonda

VICE CHAIRPERSON

THE UNIVERSITY OF ZAMBIA NATURAL AND APPLIED SCIENCES RESEARCH ETHICS COMMITTEE - IRB

cc: Director, Directorate of Research and Graduate Studies
Assistant Director (Research), Directorate of Research and Graduate Studies
Assistant Registrar (Research), Directorate of Research and Graduate Studies

Appendix 2: Introductory Letter

THE UNIVERSITY OF ZAMBIA

SCHOOL OF ENGINEERING

CIVIL AND ENVIRONMENTAL ENGINEERING

Great East Road | P.O. Box 32379 | Lusaka 10101 | Tel: (+260)-211-293 792 | 290 962

Email: head-civil@unza.zm | Website: www.unza.zm

15 October 2021

TO WHOM IT MAY CONCERN

Dear Sir/Madame,

REQUEST FOR RESEARCH DATA

This is to confirm that the bearer of this letter **Simukali Mulongwe,** Computer No. 2019099128 is a Master of Engineering (MEng) student at the University of Zambia, in the School of Engineering, Department of Civil and Environmental Engineering.

He is currently researching on "**EFFICACY OF THE ENVIRONMENTAL LAWS IN ZAMBIA'S MINING SECTOR**". It is for this reason that we write to you so that you may kindly assist him with any information and data to enable him successfully carryout and complete his research.

The information will be used solely for research purposes.

Yours faithfully,

Dr. Balimu Mwiya
HEAD, DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

Excellence in Teaching, Research and Community Service

Appendix 3: Interview Questions and Participants' Responses

Interview questions were prepared as per particular category of participants as shown in the tables below:

a) Category One of the Participants – Regulatory Institutions

This category targeted participants from institution mandated to protect the environment. These included ZEMA, MSD and selected Municipalities on the Copperbelt Province and Kabwe District.

Table 3: Category One of Participants - Regulatory Institutions

Name of Institution	Interview Questions	Participants' Responses
Zambia Environmental Management Agency (ZEMA)	What mandate does your institution have in environmental management in the Country?	d) To protect human health and the environment e) To regulate and coordinate the management of natural resources and prevent and control environmental degradation for sustainable development
Mines Safety Department (MSD)		The Mines Safety Department is responsible for all matters pertaining to the safety and health of persons employed in exploration, mining and mineral processing operations throughout the Republic. It is also responsible for all matters touching on the safety of manufacture, possession, storage, transportation, use, destruction, exportation and importation of all civil explosives in Zambia. The department is further, responsible for the formulation and enforcement of occupational health and safety standards as well as the promotion of effective environmental management programmes and the prevention of wasteful practices in the mining industry as required by the Mines and Minerals Act and the Explosives Act together with their subsidiary legislation. In summary, MSD's duty is to ensure that the Mines (Artisans, Small Scale and large scale) are in compliance with the mines and minerals development and other pieces of legislation governing the sector.

Table 3 Continues

Name of Institution	Interview Questions	Participants' Responses
Kabwe Municipal Council (KMC)	What mandate does your institution have in environmental management in the Country?	The local authority has the mandate of ensuring that the environment is safe and health for the people to live in. For example, the collection of garbage and its proper disposal, burying of ditches round the district to prevent water accumulation which in can could be breeding sites for mosquitos and other vector. Has the Mandate to ensure safety of the environment and the general public as outlined in various Laws of Zambia such as the Public Health Act, Environmental Management Act etc.
Chingola Municipal Council (CMC)		• Enforcement of relevant laws in environmental management which includes Public Health Act, Environmental Management Act • Prevention of environmental pollution • Sustainable solid waste management
Zambia Environmental Management Agency (ZEMA)	What current policy is guiding your operations and when was it formulated? Is it still effective?	The National Policy on the environment of 2007. The policy was still active although it was scheduled for review.
Mines Safety Department (MSD)		Primarily, the Mineral Resources Development Policy – formulated in 2013. The policy is still in force and saw the formation of the Mines and Minerals development Act No. 11 of 2015. Environmental Management Act No. 12 of 2011 Statutory Instrument No. 29 of 1997, which is the Mines and Minerals Environmental Regulations. All the above are still in force.
Kabwe Municipal Council (KMC)		Currently the local authority is using the Local Government Act No. 2 of 2019, Solid Waste Regulation and Management Act, Public Health Act Cap 295. They are still being used.

Table 3 Continues

Name of Institution	Interview Questions	Participants' Responses
Chingola Municipal Council (CMC)	What current policy is guiding your operations and when was it formulated? Is it still effective?	Does not have a stand-alone policy but borrows heavily from the Environmental Management Act of 2011
Zambia Environmental Management Agency (ZEMA)	What is the structure (establishment) of your institution? Describe the proposed amendment (if any) to the existing structure and the reason?	ZEMA is headed by the Director General, four directorates: Operations; Planning and Research, Human Resources and Administration and Legal Services. This is followed by Managerial positions: Manager- Environmental Assessments, Operations, Planning and Climate change and Natural Resources. There are five units as listed below headed by Principal Inspectors: • Environmental Assessment • Pesticides & Toxic Substance/Ozone Depleting Substances • Waste Management • Air and Noise • Water Resources
Mines Safety Department (MSD)		
Kabwe Municipal Council (KMC)		The municipality is headed by Town Clerk => Directors =>Chief Officers =>Senior Officers =>Officer =>General Workers
Chingola Municipal Council (CMC)		The Mayor (Board Chairperson), Councillors, Town Clerk (as CEO), Seven Directors and Support Staff
Zambia Environmental Management Agency (ZEMA)	What is the total number of staff responsible for environmental monitoring /inspection/ compliance?	Fifty-seven (57) under operations under operations against the establishment of seventy – two (72)
Mines Safety Department (MSD)		The Environment Section has a total number of 15 staff. However, they are complemented by staff from other units such as Mining, Explosives, and Machinery. All carryout inspections in mines.

Table 3 Continues

Name of Institution	Interview Questions	Participants' Responses
Kabwe Municipal Council (KMC)		Ten (10) Public Health officers. Also there are others from planning department.
Chingola Municipal Council (CMC)		Fifteen officers (15)
Zambia Environmental Management Agency (ZEMA)	How many department does your institution have to carry out environmental monitoring/ inspection/ compliance?	The institution has Operations Department with the following units: • Water Unit • Environmental Assessment Unit • Pesticides & Toxic Substance/Ozone Depleting Substances Unit • Waste Management Unit • Air and Noise Unit • Climate Change and Natural Resources Unit. Other Departments are: Directorate of Legal Services Planning, Information and Research Human Resources Department Accounts and Procurement Departments
Mines Safety Department (MSD)		There are two units directly linked to environmental management. These are Environmental and Mining units that both are under Mines Safety Department
Kabwe Municipal Council (KMC)		Mainly two departments are involved. These are Public Health Dept. and Planning Department
Chingola Municipal Council (CMC)		Two, Public Health Department and Planning Department

Table 3 Continues

Name of Institution	Interview Questions	Participants' Responses
Zambia Environmental Management Agency (ZEMA)	What are existing Laws/Regulations enforceable by your institution to promote environmental protection in the Country? Also state the enforcement procedures.	The Environmental Management Act No. 12 of 2011 and its subsidiary Legislation **Regulations** The Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations, Statutory Instrument No. 28 of 1997; Environmental Management (Licensing) Regulations, Statutory Instrument No. 112 of 2013; and The Environmental Management (Extended Producer Responsibility) Regulation Statutory Instrument No.65 of 2018. Environmental Management/Environmental Assessment (SEA) 48 of 2021
Mines Safety Department (MSD)		Mines and Minerals development Act No. 11 of 2015. Environmental Management Act No. 12 of 2011 Statutory Instrument No. 29 of 1997, which is the Mines and Minerals Environmental Regulations. MSD enforces the law by doing routine inspections and advice the mines on how they can better ensure environmental compliance. If the Mines are still in breach of the regulation after the time agreed within which to rectify/make good the identified problems, Failure to comply, charge letters are issued based on the penalty units stipulated in the law for that particular offense. In certain instances where there is eminent danger, the officers suspend/and or close operations until the issues raised are attended to the satisfaction of the law. In certain instances, cases are taken for litigations by the courts of law.

Table 3 Continues

Name of Institution	Interview Questions	Participants' Responses
Kabwe Municipal Council (KMC)	What are existing Laws/Regulations enforceable by your institution to promote environmental protection in the Country? Also state the enforcement procedures.	Public Health Act, CAP 295 of the Laws of Zambia Solid Waste Regulations and Management Act, Statutory Instrument No. 12 of 2018, Environmental Pollution and Control Act. Local Government Act **Enforcement Procedure** • Inspect, Verbal warning • If not abiding, written warning/notice is issued, • Still not abiding, case advanced to the courts of law for prosecution.
Chingola Municipal Council (CMC)		**Existing Laws/Regulations** • Environmental Management Act, 2011 • Public Health Act, CAP 295 • Solid Waste Regulations and Management Act, 2018. • Water Resources Management Act, 2011 • Statutory Instrument No.112 of 2013 **Enforcement Procedure** - Monitoring/inspection to establish offenses - Generation of compliance orders - Inspection to verify compliance - Generation of non-compliance orders - Prosecution of offenders
Zambia Environmental Management Agency (ZEMA)	How often does your institution carry out monitoring/inspection programs?	Monitoring is done twice in a year. Compliance monitory every after 6 months (schedule one) and there are those that are done as and when need arises (complaints are received). Inspections are done also even on a daily basis as and as when need arises.

Table 3 Continues

Name of Institution	Interview Questions	Participants' Responses
Mines Safety Department (MSD)	How often does your institution carry out monitoring/inspection programs?	Not very regular due to lack of consistent funding from the government. Each the department sets a target of conducting over 220 inspections/audits. However, it has been a challenge to meet the target due to the above reason stated. The department also conducts spontaneous inspections in cases of fatalities/accidents in the mines. Including spillages and discharges into the environment.
Kabwe Municipal Council (KMC)		There are routine inspections conducted every three months for each premise while others are conducted as and when there is complaint received
Chingola Municipal Council (CMC)		Monitoring/inspections are conducted as follows: - Routine inspection are conducted quarterly. - Upon receipt of complaint - Renew of compliance certificates and licences
Zambia Environmental Management Agency (ZEMA)	What challenges does your institution face during execution of its mandate?	Inadequate funding and transport which affects the effective and efficient implementation statutory mandate (inspections, audits etc.) Low staffing levels under operations department Inadequate equipment for members of staff when conducting inspections and audits Public complaints on environmental pollution. Industries resisting entry into their premises for inspectors to carry out their mandate. Non-compliances by industries.

Table 3 Continues

Name of Institution	Interview Questions	Participants' Responses
Mines Safety Department (MSD)	What challenges does your institution face during execution of its mandate?	Lack of sufficient funding to carryout inspections limits MSD to carry out its mandate. Many are the times when inadequate resources are allocated making it difficult for the inspectors to complete their scheduled inspection. The department has a country wide mandate. Language barrier – some Chinese run mines have presented challenges when it come s to render technical advice on matters relating to safety and environment on their mines due to language challenges. They tend to be versed in Chinese machining it difficult to communicate. Political interference Resistance by the mines owners – sometimes officers are delayed to access the premises for inspections.
Kabwe Municipal Council (KMC)		Lack of adequate transport and enough manpower/ human resource, Lack of adequate equipment for assessment purpose Obstruction and interference/political Non adherence to laws by community members Financial constraints
Chingola Municipal Council (CMC)		- Non-compliance to specific requirements in the law - Non-availability of field monitoring equipment - Political interference - Transport
Zambia Environmental Management Agency (ZEMA)	What punitive measures are taken against non-compliance? Also state the procedures (including timelines).	There are Orders that are served on the offender, if they do not comply then ligation commences in the courts of law. The timeline is stipulated in the order depending on the offence committed.

Table 3 Continues

Name of Institution	Interview Questions	Participants' Responses
Mines Safety Department (MSD)	What punitive measures are taken against non-compliance? Also state the procedures (including timelines).	When a mine is found non-compliant, the offices advice on the immediate measure/steps to be undertaken and serve an actionable form where timelines ate stated, and finally signed off by a representative of the mine /company. The signing is done to demonstrate commitment by the company that the issue at hand would be attended to within the agreed time. Charges are also leveled against the non-compliant mines so as to avoid reoccurrence. The procedure involve: -The mining company is written to in which the matter surrounding issues at hand are raised -The company is requested to show cause why punitive measures should not be taken against them -In the case of a summary fine, an individual responsible for the offense is written and requested to sign a consent form for the fine to be deducted from is pay. The fine is then deposited to the government treasury. -For entities fines raised are remitted to the treasury. -In cases where the company resist, the department involve the local police officer in charge of what action (especially when operations are suspended) the department will have taken and request the police to man the premises. -Finally, court litigations are initiated either through collaborations with ZEMA who would raise a court order and proceed with prosecution or use the Attorney General's chamber.

Table 3 Continues

Name of Institution	Interview Questions	Participants' Responses
Kabwe Municipal Council (KMC)	What punitive measures are taken against non-compliance? Also state the procedures (including timelines).	Measures taken against the offenders depend on the type of the offence committed. Measures include closure of premises. Procedures verbal warning - 7 days' notice, written warning – 14 – 21 days depending on the gravity of the offense. Finally Court proceedings commenced if no compliance is attained.
Chingola Municipal Council (CMC)		Stop operations Prosecution and increased penalty fees The procedures for mating punitive measures are as stated above. The period depends on specific remedial actions/works to be expected.
Zambia Environmental Management Agency (ZEMA)	Which key departments/stakeholder do you collaborate with when executing your mandate? If so how do you collaborate/interface?	Various stakeholders depending on the nature of the activity, government line ministries (Local Government, Ministry of Health, Water Resources Management, the Energy Regulation Board, Ministry of Mines and Minerals Development, Academia, Interested and Affected persons, and departments in charge of water, energy , agriculture, including NGOs
Mines Safety Department (MSD)		MSD work hand in hand with ZEMA. ZEMA sends mining related documents (Environmental Project Briefs of Environmental Impact Statements) to MSD and after inspecting the sites, the department comments and sends them to ZEMA so that we take part in decision making for the specific projects. Local Municipalities Zambia Police And other relevant authorities.
Kabwe Municipal Council (KMC)		Ministry of Health, Ministry of Livestock and Veterinary Services, Ministry of Water Development, Ministry of Home Affairs and Internal Security, Ministry of Information and Media. We collaborate by holding meetings and planning together as well as executing the duties as a team

Table 3 Continues

Name of Institution	Interview Questions	Participants' Responses
Chingola Municipal Council (CMC)	Which key departments/stakeholder do you collaborate with when executing your mandate? If so how do you collaborate/interface?	The institution collaborate with the following institutions: - ZEMA - Legal Department - The community and community radio stations - State police and Public prosecutor - The Judiciary. Collaboration mainly is through carrying out specific tasks as prescribed by applicable laws/

(Source: Author)

b) Category Two of the Participants – Service Providers to the Public

This category targeted especially water utility companies. The participants interviewed were from LWSC, LgWSC and Forestry Department. The participants interviewed from LWSC was a former employee of MWSC servicing communities of Chingola District. The interview questions and corresponding responses are summerised in Table 4.

Table 4: Category Two of the Participants

Name of Institution	Interview Questions	Participants' Responses
Forestry Department	What existing environmental policy/legislations (for example Acts of Parliament, Statutory Instruments etc.) govern your operations?	- Forestry Act No. 04 of 2015 - The Zambia Wildlife Act No. 12 of 1998 - Water Resources Management Act No. 21 of 2011 - The Lands Acquisition Act No. 2 of 1970 - National Heritage and Conservation Commission Act 1989 - The Environmental Management Act, 2011
Lukanga Water Supply and Sanitation Co.		-
Lusaka Water Supply and Sanitation Co.		- LWSC Environmental Safeguard Policy - Environmental Management Act 12 (2011) - Environmental Management Assessment Regulations (1997) - The Environmental Management (Licensing Regulations (2013) SI N0. 112 of 2013

Table 4 Continues

Name of Institution	Interview Questions	Participants' Responses
Forestry Department	What is your role (as an institution/company) in the implementation of the environmental policy/legislation mentioned above?	To interpret the Forestry Act in the management and utilization of forest resources and ecosystems. The Act is read together with other environmental legislation listed above
Lukanga Water Supply and Sanitation Co.		As a company our role is to supply portable water and provide sanitation services to avoid water body's contamination. We are aware of water pollutions due to mining activities which normally cause difficulties in treating the water for it to be safe for drinking. As a company we normally engage ZEMA on any water body's Pollution due to mining activities
Lusaka Water Supply and Sanitation Co.		As an institution we ensure adherence and compliance to environmental laws and policies in our day to day operations. We strive to operate within the national laws and maintain good environmental stewardships in our operations as an organisation
Forestry Department	How do mining activities impact and/or likely to impact on your operations?	Mining rights seem to supersede forest conservation rights. This means, there is negative policy interaction between mining policy and forestry policy or Act.
Lukanga Water Supply and Sanitation Co.		By affecting the water tables for our ground water and changing the water composition underground and also by Contaminating surface water by depositing soluble chemicals into the water that affects water species and water treatment making it difficult to make the water safe for drinking. This affects the water quality and making it difficult for the company to provide the service
Lusaka Water Supply and Sanitation Co.		We have surface water (Rivers) as a source of potable water. From our two water sources 60% of our water comes from underground water (Boreholes) while 40% comes from surface water. Mines have the potential to pollute both surface and ground water depending on the activities being carried out by the mines. Surface water however is more susceptible to pollution from the mines.

Table 4 Continues

Name of Institution	Interview Questions	Participants' Responses
Forestry Department	Do you think the existing environmental legislation and institutions responsible for enforcements are doing enough to protect the environment?	Yes
Lukanga Water Supply and Sanitation Co.		I don't think so because so many water bodies have being contaminated in Zambia like Kafue river when fish where dying on their own and that showed that there was some acid from the mines that was wrongly disposed and ended up into the river
Lusaka Water Supply and Sanitation Co.		The environmental legislation and institutions within the Country are sufficient, but the implementation and adherence is what is a challenge An integrated system on economic development and environmental protection however would be highly recommended and helpful in enforcing the already existing environmental laws.
Forestry Department	What would you suggest could be done to ensure improved environmental governance and compliance especially in the mining sector where negative environmental footprints are always significant?	- Carry out regular environmental audits - Formulate environmental compliance committees - Carry out regular safety health and environmental quality (SHEQ) training among employees - Undertake studies to identify all legal requirements related to environmental management and protection for compliance of all procedures - Provide environmental management and protection related input to the overall formulation of the protocols and manuals in line with ISO 14001 - Undertake joint regular site visits/meetings with process ownership/SHEQ Managers and compile environmental management and protection related data for input to the development and implementation of SHEQ in various areas within the mine - Prepare baseline data on environment and protection for use when setting SHEQ policy related objectives and before implementing any construction project within the mine - Endure are Contractors in the sector are inducted and trained/educated on the importance of environmental compliance and management

Table 4 Continues

Name of Institution	Interview Questions	Participants' Responses
Lukanga Water Supply and Sanitation Co.	What would you suggest could be done to ensure improved environmental governance and compliance especially in the mining sector where negative environmental footprints are always significant?	- Punish the law breakers so that the would-be offenders can learn and avoid future occurrences. Institute Environment monitoring techniques that can easily monitor and detect any pollution instantly so that the offenders can be dealt with right away and for quick remedial measures
Lusaka Water Supply and Sanitation Co.		Enhance compliance monitoring and equipping relevant equipment for monitoring and pollution control Put in place stiffer penalties for mines that are polluting the environment to deter them from further polluting and for the mines to manage and adhere to environmental laws and regulations.

(Source: Author)

c) Category Three of the Participants – Community (Living in Mining Towns)

Participants in this category were selected from among members of the Ward Development Committee (WDCs) and the ward councilors. WDC is one of the avenues through which the National Decentralization Policy whose objective is to empower districts and communities in order to achieve effective socio-economic development is being implemented, Members of these at a ward level hence they represent the communities where they live.

Table 5: Category Three of the Participants

Name of Community	Interview Questions	Participants' Responses
Nchanga North - Chingola	How do mining operations (both large and small scale) within close proximity affect your community? Name/list some of the specific environmental concerns affecting your community.	Air pollution It affects the health of the community
Kasompe - Chingola		Our community is not so close to the mining operations, no much adverse effect on the environment. However, the pipelines put to deposit waste can burst and pollute the area with acid

Table 5 Continues

Name of Community	Interview Questions	Participants' Responses
Makululu – Kabwe District		The effect of mining operations in our community are as follows: - Lead – source was large scale mine - Soil pollution – both large and small - Water contamination - Air and dust pollutions Makululu community is one of those that have been badly affected by lead poisoning leading to: - Poor IO in most children - Infertility, poor memory among adults
Katondo – Kabwe District		- Rampant lead pollution due to indiscriminate disposal of leaded detritus (waste) from the plant (Mine) area channeled into our main canal where illegal spontaneous structures have seemingly mushroomed. - The continuous unregulated digging and collection of Zinc silt and tailings from the banks and also inside the main Canal respectively are indeed perilous as well as a menace to the improvement of environmental infrastructure such as the canal
Nchanga North - Chingola	What environmental legislation (for example Acts Parliament, Statutory Instruments etc.) do you know govern the mining sector in Zambia? What is the role of the community in its implementation?	Not aware of any roles
Kasompe - Chingola		Not aware of any laws
Makululu – Kabwe District		- Ministry of Mines guidelines on extractive industries - ZEMA Act and Regulations that guide the conduct of most investors engaged in mining - Local authorities By-Laws The role of the community is insignificant due to poor or inadequate information.

Table 5 Continues

Name of Community	Interview Questions	Participants' Responses
Katondo – Kabwe District		- The Public Health Act, Occupation Health and Safety Act help us in the governing of the mining sector in Zambia together with other related legislations. - Our local authority, also called Kabwe Municipal Council, together with their co-operating partner the World Bank based on the global approach on Kabwe's MSWM improvement recommend that working community leaders and judicial system develop and enforce local By-Laws pertaining to waste management activities. Therefore, the role of the community is to create community – led deterrence activities based on local economic development as well as foster sustainable local development.
Nchanga North - Chingola	Are the existing environmental laws governing the mining sector sufficient to protect the environment in the mining towns/areas? What would you suggest/recommend should be done to ensure improvement in the legislation?	To sensitize the people on the mining activities
Kasompe - Chingola		To educate people on the existing laws Provide support to communities that need to know the laws through giving materials to local structures like the WDC and Councilors
Makululu – Kabwe District		May be enough, only if adherence can be enforced and monitored by the regulatory authorities such as ZEMA and inspectorate division of the Ministry of Mines and oversight by the relevant NGOs for example the Human Watch.

Table 5 Continues

Name of Community	Interview Questions	Participants' Responses
Katondo – Kabwe District	Are the existing environmental laws governing the mining sector sufficient to protect the environment in the mining towns/areas? What would you suggest/recommend should be done to ensure improvement in the legislation?	Yes they are. But community-led initiatives and participation in tandem with the legislation should be optimized
Nchanga North - Chingola	Are the regulatory authorities (ZEMA, Ministry of Mines – MSD, the Council etc.) doing enough to ensure the environment is protected in mining areas?	I don't know.
Kasompe - Chingola		Not aware of any at the moment. But just know of the Council implementing women empowerment.
Makululu – Kabwe District		No. Not enough is being done Not enough and strong, punitive measures could be traced to those who fail to comply
Katondo – Kabwe District		Not at all. Why? Because the investors operating in mining areas are not constantly monitored by creating incentives for obedience and sanctions for correction, environmental health improvement and resource mobilization.

Appendix 4: Acceptance Notification

Scientific Research Publishing
https://www.scirp.org

Scientific Research

Journal of Geoscience and Environment Protection
ISSN Print: 2327-4336, ISSN Online:2327-4344

Acceptance Notification

Dear Author(s),

March 22, 2023

Thanks for your contribution to *Journal of Geoscience and Environment Protection*. We are pleased to inform you that your paper:

ID: 2172503

Title: Efficacy of the Environmental Laws in Zambia's Mining Sector

Author(s): Simukali Mulongwe

has been accepted for publication. Congratulations!

This paper will be ready for publication in the forthcoming issue if the following three procedures are completed within one week:

Step 1: Sign the copyright form

Step 2: Finish payment for article processing fee $**299USD** and return the receipt to us:

1. Bank Transfer:

Account: 848825998838
Beneficiary Name: Scientific Research Publishing Limited
Building 5, Headquarters Space of Optical Valley, Tangxun Lake North Road #38, East Lake High-Tech Development Zone, Wuhan 430223, Hubei Province, China
Swift: HSBCHKHHHKH
Bank Name: The Hongkong and Shanghai Banking Corporation Limited (HSBC)
Bank Address: Head Office 1 Queen's Road Central Hong Kong, Hong Kong, China
Website: www.hsbc.com.hk

2.Online Payment:

For Credit Cards issue please click here,
https://papersubmission.scirp.org/payment/initPaypal

Step 3: Revise the paper according to the comments in the submission system and format your paper according to the template.

Please login to the system using your login name and password:
https://papersubmission.scirp.org/center to view all the information.

If you have any questions, please feel free to contact us.

Best regards,
GEP Editorial Office
Email: gep@scirp.org
https://www.scirp.org/journal/gep