A Political Ecology of Copper Production and Environmental Degradation In Zambia

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DECLARATION:

I, Chalwe Charles Mwansa, declare that the thesis hereby submitted is my own work and it has not previously been submitted for a degree, diploma or other qualification at the University of San Francisco or any other university. The views stated therein are those of the author and not necessarily those of the University.
DEDICATION AND ACKNOWLEDGEMENT

To my late mother, Charity Chanda Mwansa, “A True Son Never Forgets.” I wish to thank my God for the many mercies she has shown me to sustain my life. I would also be failing if I do not mention the University of San Francisco for providing the necessary facilities.

Many thanks to my advisor Professor Brian Dowd-Uribe. Your critical comments, ideas and suggestions helped fully conceptualise and deepen the research and gave this paper a better focus. Thanks also to Professor Lucia Cantero, without whose encouragement and support I would not have been able to make it this far.

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**Acronyms**

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<th>Description</th>
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<tr>
<td>CEMP</td>
<td>Consolidated Environmental Management Plan</td>
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<td>CEP</td>
<td>Copper Belt Environmental Project</td>
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<td>ECZ</td>
<td>Environmental Council of Zambia</td>
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<tr>
<td>EIAR</td>
<td>Environmental Impact Assessment Regulation</td>
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<td>EMA</td>
<td>Environmental Management Act</td>
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<tr>
<td>EMP</td>
<td>Environmental Management Plan</td>
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<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
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<td>EPPCA</td>
<td>Environmental Protection and Pollution Control Act</td>
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<tr>
<td>FDI</td>
<td>Foreign Direct Investment</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>IMF</td>
<td>International Monetary Fund</td>
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<td>LME</td>
<td>London Metal Exchange</td>
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<td>MCM</td>
<td>Mopani Copper Mine</td>
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<td>MMD</td>
<td>Movement for Multiparty Democracy</td>
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<td>MTENR</td>
<td>Ministry of Tourism, Environment and Natural Resources</td>
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<tr>
<td>NCCM</td>
<td>Nchanga Consolidated Copper Mines</td>
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<td>NEAP</td>
<td>National Environmental Action Plan</td>
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<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
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<tr>
<td>OPEC</td>
<td>Organization of Petroleum Exporting Countries</td>
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<td>RCM</td>
<td>Roan Consolidated Mines</td>
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<tr>
<td>RST</td>
<td>Rhodesia Selection Trust</td>
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<tr>
<td>SAP</td>
<td>Structural Adjustment Programs</td>
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<td>SO2</td>
<td>Sulphur Dioxide</td>
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<td>UNIP</td>
<td>United National Independence Party</td>
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<td>WB</td>
<td>World Bank</td>
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<tr>
<td>WTO</td>
<td>World Trade Organization</td>
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<tr>
<td>ZCCM</td>
<td>Zambia Consolidated Copper Mines</td>
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<td>ZEMA</td>
<td>Zambia Environmental Management Agency</td>
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CHAPTER ONE: Focus of the Investigation

1.1 Introduction

Natural resources such as copper, oil, gold, diamonds and manage historically play a dynamic role in many countries’ development and growth, as they provide employment, generate tax revenues and earn foreign exchange. The impact of mining sectors on economic development in these countries cannot be overemphasized, as they create employment opportunities for individuals on the domestic, sub-regional and international levels (i.e. direct or indirect employment, e.g. mining suppliers, contractors, international consultants, engineers etc.), and transfers modern technology and skills, thus altering the structure of their economies and providing the basis and potential for “sustainable growth.”

Copper is one resource which has the potential to build a nation’s economy through the injection of enormous levels of foreign investment and the transfer of advanced technology and skills. One of world’s largest sources of copper ore is found Zambia. Following the first commercial mine, which was opened in 1928 at Roan Antelope (now Luanshya), copper mining has dominated Zambia’s economy, with Zambia being the second largest producer of copper in Africa following the Democratic Republic of Congo (DRC).¹

Copper mining in Zambia accounts for about three quarters of the nation’s export earnings,² 16% of the nation’s gross domestic product (GDP) and roughly 20% of the overall formal

employment.\(^3\) The mining industry as a whole was reported in the Government’s 2015 Economic Report to have contributed $5,457.1M US dollars (74.7 percent) of the entire export earnings of $7,305.71160 million in 2015. Of this amount, $5,304.3M US dollars originated from the auctions of copper and cobalt only.

Although the immense contribution of mining toward economic growth and public finance, copper mining in Zambia has also produced enormous negative social-environmental impacts, owing to historical legacies from mining. This reinforces the notion that mineral wealth does not in the long term sustain and increase a nation’s economy in a manner that provides equitable development; indeed, in many cases, it hinders inclusive development and is responsible for environmental degradation and persistent poverty, sometimes leading to social unrest and conflict. For example, Zimbabwe has enjoyed huge diamond and gold revenues from as far back as the late 1960s; nevertheless, its per capita GDP is currently among the lowest in the world.

Copper mining remains the backbone of Zambia’s economic sector. Yet inadequate resources and training, and the adoption of cheap but potentially dangerous approaches to extraction and processing of minerals, has created significant dangers for both local communities and the environment at large. Such a situation has been and is being experienced in most of Zambia’s copper mining districts. It is important to measure the scale of these social and environmental problems and to advance practical methods to deal with them. For example, the *Consolidated Environmental Management Plan (CEMP)* assessed the impact of copper mining on the Zambian Copper Belt Province and determined that most of the mining townships had significant levels of

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contamination of copper and cobalt elements, resulting in acid drainage and metal absorption in the province’s streams and rivers.  

Moreover, chemical spillage and leakages into the main water bodies in the rural areas surrounding the mining townships has created a serious food security threat, as farmers are unable to safely irrigate their crops or water their animals, and the food produced on the contaminated land endangers biodiversity, the health of both human and animal life, and affects residents’ economic livelihood. Frequent leakage of contaminants around rivers has forced many native settlers to abandon their ancestral lands and relocate to safer places. This was the case in the village of Shimulala in Chingola town, where the mining giant Vedanta’s subsidiary company KCM spilled toxic waste into the Mushishima stream, turning the water into a river of acid. In 2010, KCM drilled a borehole to provide clean water for the village, but a leaked document shows that the water from the borehole is also contaminated.

These undesirable ecological and social issues which are intrinsically linked with mining have serious implications for the economic growth and development of the nation. In Zambia, there are approximately 10 functioning copper mines, with 17 international companies and over 87 local contractors. Several of these companies have come into operation by way of mergers, thus multiplying the scale of their actions into other provinces in the country, namely North-western, 

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5 Ibid.


7 Ibid.
Eastern, Southern and Central Provinces.\(^8\) The activities of these companies have also affected local livelihoods and environmental conservation efforts.

This thesis explores the impact of large scale copper mining on the environment and the distribution of its benefits. This will be achieved using the Copper Belt Province as a case study. The Copper Belt Province of Zambia is one of the nation’s largest copper ore producing provinces, with six active copper mines dating as far back as 1928.\(^9\) This study will use a political ecological framework to show that Zambia’s mineral resource wealth has produced a sequence of economic and political realignments arising from the operations of the copper mining industry that has subsequently negatively impacted the local environment and the communities who live in, and depend upon it.

1.2 Formulation and Background Context

The Republic of Zambia is endowed with many minerals such uranium, gold, emeralds, zinc, coal, cobalt and amethyst, to name but a few.\(^10\) Nevertheless, the nation is principally reliant on the large-scale extraction of copper for its export earnings, tax revenue and direct and indirect employment opportunities. Commercial copper mining in Zambia started in the late 1920s; thus, the country has a long history of copper mining activities. At independence in October 1964, Zambia’s Gross National Product per capita was one of the highest on the continent, mainly due

\(^9\) Ibid.
to the copper mining industry, which in 1960 accounted for 90% of its total export earnings\textsuperscript{11} and contributed 16% of wage employment.\textsuperscript{12}

Unfortunately, the nation’s reliance on copper has made her a mono-economy, primarily dependent on the export of one major natural resource to generate government revenue and earn foreign exchange.\textsuperscript{13} In an increasingly global economy and marketplace, mining companies are not limited to domestic markets; rather, they are constantly searching for future potential markets to boost their revenues. This globalization of the mining industry affects copper production in Zambia owing to its reliance on foreign direct investment, technological transfer, and enhanced trade opportunities beyond domestic borders.\textsuperscript{14}

Multinational corporations (MNC) play a huge role in Zambia’s mining industry, because they operate on a global scale with major activities and strategies centrally determined by their boards in developed countries. Multinational corporations such as the Anglo-Swiss company Glencore, First Quantum Minerals Ltd of Canada and the London-based Indian founded mining company of Vedanta Resources plc are able to mobilise capital investment resources which often far exceed the annual GDP of emerging nations like Malawi, Lesotho and Zambia. As the academic scholar Todaro\textsuperscript{15} has observed, “Their capital security gain has permitted MNCs to increase their economic and political strength in emerging nations through product market supremacy, thus conferring upon them the ability to manipulate prices and incomes and to conspire with other firms in limiting access by other potential players.”\textsuperscript{16} In the case of Zambia, the influence of

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\textsuperscript{11} Osei-Hwedie, Z. B. \textit{Development Policy and Economic Change in Zambia: A Re-Assessment}, 2003
\textsuperscript{13} Osei-Hwedie, Z. B. \textit{Development Policy and Economic Change in Zambia: A Re-Assessment}, 2003
\textsuperscript{14} Ibid.
\textsuperscript{15} Todaro, M. (1985), \textit{Economic Development in the Third World}, New York, pp 50-180
\textsuperscript{16} Ibid.
these mega-sized MNCs cannot be overstated. The mismanagement of Zambia’s copper resources by the State-owned Zambia Consolidated Copper Mines (ZCCM) Ltd. in the 1970s and 80s was one of the key factors leading to over nearly two decades of neo-liberal economic policies and strategies from the early late 1990s that saw private industry-led growth as the main path towards recovery from the economic crisis arising from the socialist economic policies of the one-party state that came to an end in 1991. Zambia, like many other nations that implemented structural adjustment program (SAP) reforms from the latter part of the 20th century, was forced to privatize industries such as mining by selling the state-owned copper mines. The Zambian government implemented policies and enacted legislation aimed at enhancing private foreign direct investment in the mining industry, and multinational corporations were awarded concessions and obtained mining licenses for huge portions of land, rich in natural ores for exploration and extraction.

Despite enormous investments in the mining sector after the privatization of the mines, the benefits accruing to the majority in the nation are scarcely noticeable. The claims of inclusive growth for which the government sold the mines are farfetched with the benefits largely reaped by the shareholders and executives of the MNCs and a small local elite. Although Zambia is today classified as a middle-income country, on many measures it is paradoxically one of the poorest nations in the world, with 79.6 % of the population living below the income poverty line of US $1.25 per day. There have in recent times since privatization, been periods of relative economic development; but this has been far from inclusive development and current mining operations have impacted negatively upon the natural environment and livelihoods that depend

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18 Ibid.
upon it. Part of the reason for increased ecological degradation in the nation relates to procedures used by the government when granting mining licences and concessions in Zambia. There has been little to no consultation with the public, local communities or other interested stakeholders on matters pertaining to “proposals, purchases, environment management and mining rights, the result being no local informed input on the potential of mining exploration developments will influence upon the environment.”

Currently, major shareholders in the Zambian mines industry include Mopani Copper Mines Plc., owned by Carissa Investments (jointly Glencore and First Quantum of Canada; the latter invested $3 billion dollars into the former ZCCM holdings); Kokoda Copper Mines, a subsidiary of Vendata Plc., which invested $8 billion dollars into the mines; J&W of Switzerland, which also owns Chambeshi Metals Plc., with Chibuluma Copper Mines subsidiary owned through the South African giant firm Metorex, which invested a sum of $406 million dollars in the mines.

The overdependence on copper by Zambia has been made more serious by the nation being a “price taker” on the London Metal Exchange. Copper produced by the nation is sold on international trade platforms such as the London Metal Exchange (LME), which sets the copper price per global supply and demand conditions. As investor perceptions about these conditions can change rapidly, the LME’s copper price is infamous for its limited period instability. In just the first two weeks of November 2016, the price has spiked by over 20% to in excess of US

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21 Ibid.
$5,600 a ton, from about $1000 less a month earlier.\textsuperscript{22} The outcome of this price instability is unpredictability and volatility in Zambia’s foreign exchange earnings and government tax revenue from copper.

As the Zambian copper mining sector is inextricably linked to the global capitalist system, it is inevitably exposed to the manner in which this system operates. Its predominant motivation is the maximization of returns to shareholders, often achieved by “price taking” companies like mining companies by the minimization of costs. Thus, for example, wage levels for local miners are kept as low as possible. Further, particularly pertinent in the context of this paper, when a conflict arises between minimizing costs and enhancing environmental safeguards through costly adjustments to processes and installations, the natural tendency of a capitalist firm is to cut corners to protect the bottom line. This is even more likely in the case of the modern MNC where the line between corporate management and the shareholders has become very blurred. Thus, the CEO of Glencore since 2002 has been Ivan Glasenburg. He has benefitted enormously from his large holdings of Glencore stock. In this context, the operational decisions taken by such a stock holding CEO and his directors are even more likely to put the maximization of returns to shareholders above any costly investments in environmental protection measures. Indeed, they are only likely to do so if required and effectively compelled to by the Governments in whose countries their mines and smelters operate.

\textbf{1.3 Research Objectives}

The study seeks to explore the impact that copper mining in Zambia has made on the environment by enriching or just preserving and conserving it on the one hand or rather

impoverishing and degrading it on the other. To do this, the study will consider the following specific objectives.

1. To investigate how mining operations in the Copper Belt Province have impacted local social and environmental conditions.

2. To assess the financial gains from copper mining and how the revenue from copper mining is distributed among the various interested parties, stakeholders and recognized participants.

3. To comprehend and critically examine the policy framework established to foster environmentally sustainable extraction of copper in Zambia, and make recommendations that will strengthen this framework for the future promotion of an environmentally sustainable copper mining industry.

1.4 Research Questions

To achieve the above objectives, the following major research questions were posed:

1. What are the political and economic factors influencing the scale, scope and distribution of the benefits accruing from copper mining in Zambia?

2. What are the types and distribution of environmental impacts associated with copper mining in Zambia?

3. What kind of environmental conservation and preservation policies and strategies have emerged to mitigate the environmental impact of copper mining in Zambia?

1.5 Significance of the Study

Copper is a commodity utilized in a wide range of sectors due to its chemical and physical properties. This study was undertaken to produce data on the influence that mining activities
have on the environment and local communities in Zambia. In explaining the effects of environmental degradation, the study results can potentially be used by various stakeholders including the government, non-governmental organizations (NGOs), the church and the private sector as well other international partners, to amend economic-environmental practices pertaining to mitigating water contamination and soil and air pollution.

Given that the Zambian government has ratified various international agreements and declarations such as the United Nations Sustainable Development Goals (SDG’s) - which include SDG number 3 (“Good health and Wellbeing”), SDG number 6 (“Clean Water and Sanitation”) and SDG number 11 (Sustainable Cities and Communities) -, this research study would avail the Government of Zambia with the opportunity to implement these declarations domestically by working hand in hand with mining companies to develop environmentally sustainable strategies.

The information gathered would furthermore support interventions by various government ministries and agencies (i.e. Ministry of Community Development as well as the Ministry of Mines and Minerals Development). The research may also contribute to the existing knowledge of mining activities and their impact on the environment, by aiding other academicians and researchers to build on the existing literature to strengthen social and civic policy appraisal and execution modalities. Communities at the local level must demand improved social corporate responsibility, and grassroots advocacy may empower them to apply the existing study results in demanding dialogue and participatory decision making on aspects related to mining in Zambia, especially as it relate to the distribution of benefits and the efforts to mitigate all negative environmental footprints of mining.
1.6 Limitations of the Study

This research had several restrictions. First, the study is constrained in scope as it is concentrated on one study area—the Zambian Copper Belt Province; therefore, it offers restrictions for broader scale generalization. In addition, it does not incorporate the successes and generally albeit inequitable economic effects of the mining industry, but instead studies the influence of copper mining on the environment and how the environment and local communities have been negatively impacted because of copper mining activities.

Second, a major limitation of the work related to the researcher’s inability to travel to the study site (the Copper Belt Province, Zambia) owing to financial and immigration restrictions. This in turn impacted the overall direction of the study, as the researcher had to rely upon existing research conducted and published by other scholars, limiting his investigative inquiry (especially in gathering information from key informants and other participants through in-depth interviews). However, with perseverance, the research was conducted. A third limitation was the difficulty of gathering literature reviews within a restricted time frame; this in turn had inferences for the theoretical depth of the investigation.

1.7 Structure of the Thesis

The study consists of five chapters. This first chapter presents the introduction of the study by covering the contextual background of the issue under investigation, addresses the statement of the problem, research objectives and questions and furthermore provides the justification for, and limitations of, the investigation. The second chapter reviews Political Ecology’s origins and development; it also highlights the significance of the conceptual framework adopted for this study, by linking the study to the debate. The chapter then discusses methods and data collection tools used for the case study site. Chapter three begins by outlining both the political and
economic background of Zambia, and how these two aspects have influenced copper mining production in the nation. Chapter four covers an overview of environmental assessment of Copper Mining by setting out a thorough description of copper production processes, debates the actors and policies involved in environmental protection, before, discussing specific pollutants that originate from the Zambian copper mines and smelters. Finally, chapter five deliberates on the findings, implications and makes appropriate conclusions and recommendations.
CHAPTER TWO: Research Framework

2.1 Political Ecology: Origins and Development

This study will use a political ecology framework to analyze the environmental impact of copper mining in Zambia, from considerations of power (policy and practice) to how the environment and communities have changed at local level. It shows how the distribution of power (which is the main subject of political science) determines the use of the natural environment between different categories and groups of humans and with regard to other species.23

The development of political ecology as a field of study and as an analytical framework arose in response to the need to analyze the dynamics of change in human ecosystems, emerging first as a subsidiary field of geography in the mid-late 1960s. The discussion of issues covered in political ecology grew out of a very large number of disjointed works from several disciplines, including geography, sociology, anthropology, biology, and ecology.24 The application of a political ecology perspective has been instrumental in assisting scholars to comprehend how and why the costs and benefits related to changes in ecology and the environment that arise from human activity are unevenly dispersed among humans according to the economic and political power they are able to exercise.25 The field has greatly expanded to include discussions on a wide range of environmental problems such as loss of topsoil, disposal of nuclear waste, global population

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25 Ibid.
growth, global warming, ozone depletion, depletion of global fisheries, species extinction, desertification, environmentally-related illness, acid rain, and decline in air and water quality.\textsuperscript{26} One approach to political ecology joins human ecology (largely, the study of human social existence and habitat) with a social and political examination, i.e. how distinct groups of players at diverse scales challenge the rights of other players to revenues and other benefits from an economic activity that uses natural resources in a predominantly ecological setting.\textsuperscript{27} The overriding necessity for access and control over land, space and ecological resources, \textsuperscript{28} suggests that power relationships are key to the political ecology method—specifically, the central attention it gives to its political analysis regarding the insatiable need for humans to use natural resources.\textsuperscript{29} An examination of “scale” (physical, financial, information, political, social) in political ecology deepens an understanding of the \textit{resource curse}\textsuperscript{30}, which is the failure of many resource-rich nations to benefit significantly, sustainably and equitably from their natural resource capital, and for their governments to respond effectively to the public welfare and economic empowerment requirements of their citizens. Thus, for example, because of poor public administration and governance in many developing countries and unfair trade practices between unevenly balanced nations in a globalised capitalist world, the MNCs from rich nations can extract concessions such as tax breaks for their mining activities, reducing the public finance benefits of being a natural resource rich country. There are very few African nations that have


\textsuperscript{27} Brosius JP. Comments to A. Escob-after nature: steps to an anti-essentialist political ecology. Cur Anthropol 1999, 40:16-17.


gained sustainable and equitable development from their possession and exploitation of their mineral resources.\textsuperscript{31}

The scholarship on mining raises huge concerns in attempting to comprehend environmental and individual livelihood sustainability. It is evident that the political ecology of mining has a combined appeal where biophysical and social/political conditions are intimately entangled. From this standpoint, it can be seen that the mining industry in emerging countries operated overwhelmingly and disproportionately in the direction of those who have power through their control over huge capital resources.

Power is said to be “the capacity of a performer to regulate their own synergy with the environment and the cooperation of other performers with the environment.”\textsuperscript{32} Power may be derived from the State, individuals and organisations alike. The exercise of power inevitably results in an uneven relationship between different groups and performers and, as a consequence, affects environmental outcomes. The exercise of power invariably favours the specific interests of those with power over other less powerful players, so dominating their legitimate interests in preserving and using ecological resources to advance their own interests. In the case of mining, land ownership and control in areas rich in mineral resources is invariably directed toward conferring commercial mining rights to powerful MNCs over enabling local smallholder farmers to continue to have access to that land for the raising of crops and animals. This result is manifested when the powerful party’s control of the ecological and natural resources is consolidated through regulation and intervention by the State to prioritize their activities over those of less powerful groups. Thus, these vulnerable groups are side-lined in policy formulation


and implementation and indeed are often abandoned, usually facing the future with increased difficulty as their source of livelihood is no longer available to them.33

In the case of Zambian copper mining, as in many other emerging nations where natural resources are extracted, the “resource curse” is apparent. The “resource curse” postulates that possession of mineral resources does not always lead to sustainable and equitable development for the majority of the citizens of a resource rich nation. Indeed, in most cases they have turned out to be curses rather than blessings in that they breed corruption and rent-seeking behaviour by state officials, delay the adoption of more broad-based development strategies that can produce equitable economic growth and expose the nation to significant external shocks as a result of highly volatile commodity prices. There are so many influential and powerful players in resource rich countries - such as highly capitalised and profit maximising multinational mining companies (MNCs), the State and its rent-seeking officials and other local elites (e.g. traditional leaders) who can be subverted into supporting the interests of the MNCs such that these MNCs take away a disproportionate share of the nation’s treasure. The local people and their communities are left to cope with the negative effects of mining these resources, including alienation from the benefits they traditionally received from the land, leading to greater material hardship and insecurity and a life lived in a degraded natural environment. In some cases, like that of the Democratic Republic of Congo (DRC), and previously in Angola with the UNITA rebels, conflict over their resources (diamonds) lead to political and social unrest and conflicts and the loss of life for many hundreds of thousands of people.34. These battles originated from disputes over income streams, scuffles over area dominance, inequitable access to ecological resources,

33 Ibid, 40
failure to protect human and citizen rights and disapproval of individuals and groups over the distribution of mineral rentals.\textsuperscript{35}

Political ecology, like many other philosophical concepts and analytical frameworks, has not advanced far without having its own challenges and detractors within academic circles, largely emanating from the high level of ambiguity that exists when it comes to defining and classifying what political ecology is and what it means. Some scholars have argued that it is simply a study plan;\textsuperscript{36} awkwardly enough, others have called it a method.\textsuperscript{37} Some address it as a standpoint,\textsuperscript{38} with others calling it a training method.\textsuperscript{39}

\textbf{2.2 Conceptual Framework}

The broader political economy has been further explained in terms of political ecology by Piers Blaikie in \textit{The Political Economy of Soil Erosion in Developing Countries}.\textsuperscript{40} This work both elaborates the political discussion of soil erosion’s causes and impacts and recognizes the diverse social contexts in which soil erosion is considered problematic.\textsuperscript{41} Blaikie’s work uses chains of explanation at multiple scales; it acknowledges various root causes of degradation, and examines the social and institutional impacts on environmental knowledge itself.\textsuperscript{42}

This framework sheds light on pertinent issues associated with mining, for example, the effect of local inequalities on land use and land degradation such as reduced access to land ownership due to over population, increased pressure from other industrial sectors in need of land (i.e.

\begin{flushleft}
\textsuperscript{35} Ibid.
\textsuperscript{40} Blaikie, P. and Brookfield, H. 1987, \textit{Land Degradation and Society}, Methuen, London.
\textsuperscript{41} Ibid.
\textsuperscript{42} Ibid.
\end{flushleft}
commercial agriculture, cattle rearing and urban growth development). Multiple scales of analysis provide different types of information on societal and environmental processes that operate at different scales, thus a multi-scale approach is necessary to fully understand trends and their causes. Blaikie applied the multi-scale approach to the case of Luangwa National Park, in Eastern Zambia, using land-based research methods (See Figure 1).

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<tr>
<th>Band/ Association</th>
<th>Position in Political Economy</th>
<th>Root of Authority</th>
<th>Benefits and Objectives</th>
<th>Methods of Achieving Objectives</th>
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<td>Trackers-Farmers</td>
<td>Ostracized, and omitted</td>
<td>Partial but available through traditional leaders</td>
<td>Basis of methods; land for farming</td>
<td>Furtiveness and thieving</td>
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<tr>
<td>Expedition Hunters</td>
<td>Emigrant personal small businesses</td>
<td>Shrewd informal discussions</td>
<td>Privileges to hunt in park</td>
<td>Cars, weapons, native information</td>
</tr>
<tr>
<td>Preservation Groups</td>
<td>Interacted with Influence Zambian bureaucrats, Influential positions</td>
<td>Absence of knowledgeable sentiments in Zambia</td>
<td>Preservation of some animals</td>
<td>Lobbying, publications, international networking</td>
</tr>
<tr>
<td>Administrative Middle Class</td>
<td>Governor state apparatus, access to capital</td>
<td>Part of leading association</td>
<td>Ad hoc contracts, overseas trade</td>
<td>Legislation, budget allocation</td>
</tr>
<tr>
<td>Researchers</td>
<td>Admission to highest placements of power</td>
<td>Knowledge as Legitimacy</td>
<td>Growth of “local Strategies”</td>
<td>Publications, personal admission to authority</td>
</tr>
</tbody>
</table>

**Figure 1**: Blaikie & Brookfield’s Multi-Scale Approach Framework (Blaikie 1995: 2008)

2.3 Linkage to Study

This research focuses on the effects of copper mining on local communities and on the environment in the Copper Belt Province of Zambia. The use of both a political ecology framework and the concept of multiple scale analysis will provide a better comprehension of how copper mining operations influence environmental outcomes in the local countryside and communities, keeping in mind their interaction with power dynamics as they operate at different
levels. Both the theory and concept of political ecology will be useful in understanding how environmental strategies are carved out.

2.4 Methods and Data Collection
The study involved the collection of secondary data in an effort find answers to the paper’s research questions. The secondary data used has been critically assessed to validate the credibility and reliability of key official documents, publications, reports and various internet sourced articles. The paper focuses on a case study of the Copper Belt Province of Zambia, examining the impact of large scale copper mining on the environment and surrounding communities, as well as observing the environmental policies put in place to curtail negative social and environment effects.

2.5 Research Methods
Qualitative methods have a descriptive capability based on primary and unstructured data, and are an effective method for studies of a liberal nature such as sociology. Gunnarson contends that the advantage of applying a qualitative technique in research is that it takes into consideration the overall picture, objectively observing variables in their natural habitats. A primarily qualitative approach was therefore selected over a more quantitative method as the proper approach to guide this research, focusing on how copper mining in Zambia is either empowering or impoverishing the environment and the people in it.

2.6 Relevant Literature

Project-related documents such as relevant Environmental Impact Assessments (EIA), reports from the Copper Belt Environment Project (CEP),45 the Government of Zambia’s Consolidated Environmental Management Plan (CEMP) and its related Legislative Action Plan and Social Impact Assessment Report (ESIA) were also used as references. Other Government progress reports, reports of non-government organizations and other academic articles on the mining sector were also referred to.

2.7 Case Study Methods

Bryman and Bell46 (2007) state that a case study methodology comprises a thorough and demanding examination of one or more cases, critically analyzing the extent of the case. The use of case studies cuts across a variety of academic fields and disciplines such as in anthropology, ethnography, geography, politics, philosophy and scientific research. Nevertheless, there are limitations when it comes to using a case study design. Given that one case scenario does not fit all other cases, it may create bias towards showcasing a certain group or situation. However, the drive for use of this technique is not to oversimplify the results of other cases or larger communities;47 rather, it is intended draw attention to those specific cases, examine their distinguishing settings and to generate an outline for dialogue on the issue.

2.8 Choice of Copper Belt Province as Case Study

47 Ibid.
The “copper belt” runs through northern Zambia and southern Democratic Republic of Congo. In the 2010 census, the population of the Copper Belt Province of Zambia was 1,972,317. The urban population was 376,861; rural was 1,595,456. The Copper Belt Province is an ideal case-study given the province’s large-scale mining activity, both currently and in colonial days. Mining has been identified as the chief source of most of the water, air and soil pollution in the province due to the extraction and processing of copper and cobalt ores. This provides a defined area in which to study the impact of mining on the environment and the local communities, and how environmental conservation efforts are being designed and implemented. Also, as a former long-term resident of Copper Belt Province, the researcher has first-hand experience of the mining industry’s impact on the environment and on local communities.

Even though there are about six large scale mines in the province, there have not been enough impact studies undertaken despite the vast and long-standing environmental problems they have caused. This provided the author with an opening to investigate copper mining in the province in depth, and attempt to disentangle the sensitivities and uncertainties felt by those close to mining operations, as well as to contribute to the body of work with regard to mining in the Copper belt Province.

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49 Ibid.
Figure 2: Map of Zambia highlighting Copper Belt Province\textsuperscript{50}

Figure 3: Copper belt Province Mining Locations\textsuperscript{51}

\textsuperscript{50} Map A highlights the geographical location of the Copperbelt Province on the Zambian map. http://www.touristlink.com/zambia/copperbelt/overview.

\textsuperscript{51} Map. B shows the major Copperbelt mining towns, as geographically located on the map of Zambia. The map was accessed from https://www.csrm.uq.edu.au/events/sm-seminar-chinese-mining-in-africa-its-global-controversy on 10/10/2016
CHAPTER 3: Overview of the Political Economy in Zambia

3.1 Introduction

For over half a century after her independence from Great Britain, Zambia continues to encounter severe problems including persistently high poverty rates, poor land administration, inadequate public service delivery, high pollution levels in mining areas and inadequate capacity to manage her environmental and natural resources. This chapter presents a historical and contextual background of Zambia’s political economy with a description of the political and economic influences that have shaped the governance and administration of Zambia.

Figure 4 Timeline: Political and Economic History of Zambia
3.2 The Political Economy of Zambia

In the early 1960s, Zambia was ranked as a middle-income country, with vast economic growth potential; presently, despite huge mineral resources, the country was ranked a low 139th in the world in terms of the Human Development Index of the United Nations in 2014. Zambia is a land-locked country surrounded by seven neighboring countries: Angola, Botswana, the Democratic Republic of Congo, Mozambique, Namibia, Tanzania, and Zimbabwe. Geographically positioned in central Southern Africa, it is 753,000 km² (291,000 square miles) in size, a little larger than Texas. Farming potential is relatively high due to favorable climatic conditions and rainfall patterns. Nevertheless, like many other nations in the sub-Saharan region, Zambia’s economy remains heavily dependent on the mining sector and trade, and there is a relative neglect of other high potential sectors such as agriculture, tourism and agro-processing. Large scale copper mining has been the engine of development for the country since the 1920s, initially laying the foundation favorable for investment in industry and developing an industrialized society.52

When mining exploration activities began under the administration of the British South African Corporation in 1921, the company invested massive capital resources into Zambia’s first commercial copper mines. However, prior to the mining operations, Zambia had remained scarcely populated, with the only commercial interest in the nation being access to slave labor. Slave traders exploited the area by selling slaves to rich southern groups in South Africa and Mashonaland (present-day Zimbabwe).53

52 The urban share of the population rose rapidly from 17 percent in 1960 to about 40 percent in 1980. For two decades this share has remained stable between 39 and 40 percent (World Bank, 2003).
Following the discovery of large deposits of copper ore, white settlers started arriving in large numbers, with little or no initial supporting investment in infrastructure. Men from all corners of Zambia, who prior to the opening of the mines had mainly lived in rural areas, engaged in the barter system of trade (exchange of goods), and had a subsistence fishing and an agri-pastoral economic livelihood, started migrating to the mining areas to find work. Huge investments were poured into the copper mining sector, encouraging urbanization, with urban areas being the central economic wealth zones leaving the rural areas economically backward. Investment in rural Zambia was chiefly along the rail line between the Copper belt and southern provinces, and was merely for enhancing transportation networks to facilitate swift exportation of minerals to export markets in neighboring countries with access to seaports.

This divide between rural and urban development persists today, strongly influenced by tribalism, mining and urban political power. It is a defining characteristic of Zambia’s economic growth path. Given her endowment of abundant lands and mineral wealth, and despite urbanization, a significant population still lives in rural areas, limiting their access to markets, public services and transportation.\(^{54}\) Even in urban areas, the majority of the people live in densely populated shanty compounds with inadequate housing and social amenities. Very little progress has been made when it comes to the equitable distribution of national resources, even though the nation has undergone several different forms of government administration and leadership.\(^{55}\) During the last three decades, Zambia has experienced five distinct policy regimes.\(^{56}\)

\(^{54}\) Ibid.
\(^{55}\) Ibid.
3.3 Zambia’s Unsuccessful Economic Interventions: 1965-1990

Zambia’s first President, Kenneth Kaunda, initially embarked on an economic strategy that favoured the fortunes of private sector companies like the Anglo-American Corporation that were engaged in the mining sector in what was - in the first years after independence - fundamentally a market economy.\textsuperscript{57} Mining and urban towns were significantly favored over agriculture and the rural areas because of an import substitution policy funded by revenues from rising copper exports\textsuperscript{58}. Thus, very few Zambians benefited from foreign investment in mining, specifically those that were located in rural areas, even at a time (1964-72) when the nation’s gross domestic product (GDP) increased at 5.1\%\textsuperscript{59} (see Figure 5). The economic gap between the rich and the poor was widened, and increased in the decades that followed.\textsuperscript{60}

\textbf{Figure 5. Real GDP and Population Growth, 1965-2001}\textsuperscript{61}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{gdp_population_growth.png}
\caption{Real GDP and Population Growth, 1965-2001}
\end{figure}

\textsuperscript{58} Ibid.
\textsuperscript{60} The Gini coefficient was 0.48 in 1959 and 0.59 in 1974 (World Bank, 1994).
Under the Mulungushi Economic Reforms announced on 19th April 1968, the Zambian Government began to dismantle the market economy and the private sector owned mines themselves were nationalized in 1972 ending the period of market-driven economic policies. At the same time, the Constitution was changed and the country left multi-party democracy behind and embarked on a “One-party participatory democracy” – effectively a one-party State under Kenneth Kaunda and his United National Independence Party (UNIP).

The economic, financial and political power that came with being in control of the mining sector was enormous, especially because it generated a large proportion of the nation’s foreign exchange and tax revenue. The mine workers were among the most well paid and politically active groups of employees in the country, given the role that the mining sector trade unions played in demanding improved worker conditions and increased wages, sometimes accompanied with threats of nationwide boycotts and strikes against the State.

Inequality gaps between urban dwellers and rural dwellers, created when the copper mines were nationalized, was further increased by the newly-adopted socialist policies that the Kaunda administration implemented with the goal of supporting nationalized businesses including the mines. This switch in policy orientation from a market economy to a socialist economic stance coincided with the global recession of the early 1970s, triggered by the oil price increases engineered by the cartel of oil producing countries – OPEC. The recession hit the commodity markets, and global copper prices fell. As a result, Zambia’s foreign exchange earnings and tax revenues fell rapidly and government began to borrow heavily in an attempt to maintain its spending programmes. However, the fast development of the late 1960s ended. As the recession, prolonged throughout the 1970s, export incomes and tax revenues continued to dwindle and a serious fiscal crisis developed as the Kaunda administration became more and more indebted.
Unsure if the recession was momentary, they failed to make reasonable accommodations to address the matter, (e.g. limiting spending on its subsidies and holding back on salary increments for government workers). Instead, the government borrowed, unsustainably raising its foreign debt.

Increased pressure was placed on the Kaunda administration as the growth in the nation’s GDP fell precipitously becoming negative in several years in the 1980s. For most of this decade, there was lack of real political will to make the necessary fiscal and economic adjustments and eventually meant that the government was forced to begin to implement “structural adjustment” policies by the two Bretton Woods Institutions i.e. the World Bank (WB) and the International Monetary Fund (IMF).

Until these policies were started, subsidies and consumer price controls protected most of the urban population from the effects of the recession. Further, a scheme of import licensing supported the mining industry, other nationalized industries and state owned ventures, in that they were favoured when it came to access to the country’s dwindling foreign exchange reserves. This meant that there was little practical encouragement to diversify and invest in other productive sectors, so despite all the economic policy intervention efforts, the economy staggered and remained indifferent to the strategies introduced.

The first adjustment program with IMF backing was introduced in the early 1980s when the state began to admit policy failures. Immediately, a plan of action to stabilize the economy was implemented through a structural adjustment program (SAP). Stabilization was achieved to a certain extent through better macroeconomic steadiness, but unfortunately, the lack of enthusiasm from the government to see though all policy outcomes contributed to economic
decline. Because of the nation’s inability to implement the SAP and maintain economic stability, by the mid-1980s subsidies included 20% of the economic budget, whereas prices controls for the products of a wide number of nationalized businesses made them uneconomic and in desperate need of cross-subsidization from the falling revenues from the mines.

Following the cancellation intervene reform agreements by Kaunda’s government in 1983, the government entered a second SAP aimed at reducing price controls and a general reduction of tariffs. The second SAP had a broader scope, recognizing the need to diversify and invest in other sectors including agriculture. Like earlier attempts, the success of the program was dependent on the support of the elite and urban dwellers. This led to civil unrest over food prices, and in urban towns in the Copper Belt Province, residents protested and threatened to disempower the government, specifically interest groups within the mining sector and in particular the trade unions.

As the foreign debt payments accumulated, and fearing losing popularity, the government gave in to the escalating political and economic forces by backpedaling on the IMF supported SAP. Indeed, in 1987, the Government cut ties with the two Bretton Woods Institutions and tries to go it alone though its own economic programme which it called “Growth from Own Resources”. Inflation grew and the situation became politically volatile in the Copper belt.

The economic reform policies introduced in the 1980s had some effect on restoring macro-economic balance but political support was always lukewarm and while the reforms appeared to be effective momentarily and, for a while, the financial system and economy was responsive toward growth, by 1985, the economy took a slump, and entered a recession in 1989. Political

debate and unrest mounted against Kaunda’s one party State – especially from the Zambia Congress of Trade Unions – ZCTU – led by Fredrick Chiluba, as communism collapsed in the Soviet Union and Eastern Europe and while inflation in Zambia spiraled following the rapid depreciation of the Zambian currency – the Kwacha.

It was becoming clear by 1990 that the one-party State and the socialist leaning policies implemented by Kaunda’s party UNIP (United National Independence Party) were ineffective in addressing the dire economic condition of the country. Kaunda was forced to re-establish multi-party politics and hold multi-party elections in 1991 after a new Constitution was enacted earlier that year. Kaunda’s “Growth from Own Resources” economic programme quickly unraveled as the government backpedaled on the reforms. The maize and fertilizer subsidies were enhanced, the allocation of foreign currency through a “distribution pipeline” managed by the Bank of Zambia lengthened, and civil service wages were increased to gain political mileage in the run up to the November 1991 general elections.\textsuperscript{64} The consequence of this was the further loss of donor confidence by the bi-lateral donor countries, who, following the Bretton Woods Institutions, pulled out their support for the government, owing to its breach of commitment to attaining economic reform and recovery.

Assessing the developments throughout this period, where the UNIP government maintained economic and political control of the nation for nearly three decades, copper dependence turned out to be a source of fiscal instability and ensured that the economy was always susceptible to external shocks. The economic quagmire into which Zambia increasingly became immured in the 1980s up to 1991 was the major factor in the UNIP government’s loss of political dominance in the country. In addition, the State’s administration and control of mining revenue and foreign

\textsuperscript{64} Ibid.
exchange created a powerful political elite who were nevertheless reliant on the copper mining sector for political support. Consequently, they developed many strategies aimed at appeasing urban residents in general, and the miners through broadly accepted fiscal entitlements (i.e. subsidies ranging from food to housing) financed from mineral profits, as opposed to using those resources to finance programmes and policies that promoted long term growth for both urban and rural areas.

The national budget and Zambia’s fiscal position had become progressively unsustainable since the mid-1970s, being the major victim of falling global copper prices with a growing dependence on donor assistance to finance an ever-widening fiscal deficit. With no donor support or no international financial institution willing to loan to the State from the latter part of the 1980s because of the president’s socialist approach to growth, which he called ‘humanism’, the future of the one-party State became untenable. The inadequate mineral export revenues and the government’s inability to take long term measures to diversify into agriculture and other productive sectors were among the leading causes of persistently high rates of poverty and considerable income disparity between a small urban elite and the majority who lived in peri-urban shanty compounds and the rural areas. By 1991, the dwindling proceeds from the country’s copper exports had negatively impacted the Government’s social expenditure programmes primarily aimed at appeasing the urban population – especially in the mining towns on the Copperbelt. Rationing of basic goods and services became the order of the day because of the dearth of foreign exchange and the underdevelopment of the industrial and agricultural sectors, leading people to demand for political change two decades after the country became a
one-party state in the early 1970s.65

3.4 Structural Adjustment Reforms under the MMD since 1991

The opposition Movement for Multiparty Democracy (MMD), led by Frederick Chiluba, the former leader of the powerful Zambia Congress of Trade Unions (ZCTU) which had spearheaded opposition to Kaunda’s one party State and socialist economic policies won the elections in November 1991. The MMD ran on a progressive economic platform and quickly re-engaged support from the international community, particularly the IMF and World Bank. This support was given on the basis of a promise to embark on a thorough structural adjustment programme (called the Economic Recovery Programme - ERP) modelled on the typical “Washington Consensus” model with a further commitment to transparent and responsible administration.66 The new Movement for Multiparty Democracy (MMD) party comprised a diverse alliance of intellectuals, business interests, students and trade unions that were enthusiastic about bringing a different style of leadership from its predecessor UNIP. Still, the new government was passed a poisoned chalice in the form of an unstable and stagnant economy based on an ailing copper sector, a three-figure inflation rate which had the potential to spiral into hyper-inflation, a high foreign debt burden and a depreciating currency, unemployment and under-employment for a rapidly growing and young population, low productivity especially in the mines and parastatal sectors which dominated the economy, increased poverty and large disparities in income and wealth.

The new SAP was designed with the aim of restoring macro-economic stability and arresting the economic malaise and decline. Implementation of the SAP immediately began winning back

donor confidence, with international donors supporting Zambia with close to US$1.5 billion in 1992, reaching its all-time peak. The MMD’s SAP, like similar programmes across Sub-Saharan Africa at the time, was a full blown “Washington Consensus” SAP which included restoring macroeconomic equilibrium; public sector reform; liberalization of the foreign exchange market and domestic product markets; the sale of nationalized industries and businesses; and agricultural sector reforms.67

3.4.1 Macroeconomic Equilibrium

During the transition from a one-party State to multi-party politics, Zambia experienced a record high inflation rate – reaching an annual rate of 127% in 1993, the highest it had ever been since Independence. During this period, following the liberalization of the exchange rate, the Zambian kwacha experienced rapid depreciation and interest rates rose making access to credit unaffordable. The Economic Reform Program (ERP) was launched by the government to re-establish macroeconomic stability and this was broadly achieved by 1995, when inflation had been reduced to about 26% the exchange rate stabilized (as donor support resumed) and interest rates fell. Yet the country was far from stable politically and key economic decisions – in particular the privatization of the copper mines themselves and their consequent massive recapitalization using the resources that could be mobilized by the MNCs, were delayed throughout the 1990s.68

This success was to come after the privatization of ZCCM in 2000, albeit on relatively unfavorable terms, as by the end of 1999, ZCCM was hemorrhaging money as copper prices had once again fallen and the privatization process itself was more like a fire sale. The MNCs

67Ibid.
68Political uncertainty continued to undermine private investment despite the more stabilized economic environment of the mid-1990s. As evidence of this uncertainty, Chiluba’s government banned Kaunda from running for office in 1995, and in 1997 there was an attempted coup d’état. Consequently, donors repeatedly threatened to withdraw financial support.
which bought the mines in the first years of the 21st century was able to negotiate favorable “development agreements” with the Government which included generous tax concessions and – most importantly from the perspective of this paper – no liability for past environmental degradation caused by the copper mines. The poor performance of the copper mining sector since the mid-1970s, had gradually led to an increasingly inadequate management of the negative environmental impacts arising from copper mining and ore smelting activities. Thus, during the sale of the various mines operated by ZCCM to various MNCs, liability for the adverse environmental legacies was an important matter throughout the negotiations, with the private MNC investors unwilling to accept legal responsibility for historical environmental liabilities, given both the degree and gravity of mining-related ecological and public health obligations that had arisen over the previous three decades.

Further, as part of the ERP, the government introduced a “cash budget system” in 1993 as an integral measure to reduce the high inflation rate. This restricted the government to available funds, spending only from tax revenues already collected. While this measure was very effective in reducing inflation, and restoring macro-economic stability, it also saw a large contraction in public expenditure, even on areas like health (including environmental health programmes important for mining communities) and education where demands were rising as a result of a rapidly growing and youthful population and in the face of the HIV pandemic. In 1996, when the HIV/AIDS pandemic was at its highest in Zambia, before the advent of ARV treatment, 16% of the nation’s adult population was living with HIV, with higher occurrence in urban areas. The Copper belt and Lusaka were reported to have the highest number of people living with the virus and the average life expectancy rate dipped below 40 years. Indeed, under the “cash budget”

system, the MMD administration’s public spending cuts were considerable. This undermined the administration’s ability to surmount its political reliance on urban communities and the miners. Instead of reducing the fiscal costs associated with a bloated civil service, the MMD administration opted to rid itself of publicly owned ventures (thereby creating large numbers of retrenchees) and cutting social expenditure. This restrictive fiscal stance was sustained throughout the 1990s and slowing wore away the political support for the MMD Government.

3.4.2 Debt Relief through the Highly-Indebted Poor Countries (HIPC) Initiative

Apart from the privatization of the mines in 2000, one initiative that has proved vital for the development of Zambia’s economy and public finances has been the forgiveness of the clear majority of its foreign debt but this did not take effect until 2005 because of 15 years of “structural adjustment”. In 1991, Zambia was heavily in debt to foreign creditors, mainly the two Bretton Woods Institutions and foreign governments, amounting to more than US 7 billion dollars. While US 0.8 billion dollars was forgiven by way of debt cancellation in 1993, this the rate of debt forgiveness slowed during the 1990s as foreign creditors (chiefly the IMF, WB and bi-lateral donor nations) attached policy conditionality’s linked to the full implementation of the ERP before providing more debt relief. Thus, during the period of 1991 to 2005 Zambia continued to be one of the most deeply indebted nations in the world.

The consequent foreign debt overhang and interest payments not only absorbed foreign exchange but restricted social spending throughout the period of economic recovery. However, during the early years of the new century, under the leadership of late president Levy Mwanawasa (2002-
Zambia become eligible for debt relief under the Highly-Indebted Poor Countries (HIPC) Initiative, enabling the write-off of two-thirds of the debt, provided certain further economic adjustment and fiscal conditions were met. This lead to a Government preparing a Poverty Reduction Strategy Paper (PRSP) that began to more effectively address social issues, particularly the rapidly rising problem of HIV/AIDS with the advent of ARV treatment for people living with the virus. Zambia qualified for HIPC debt relief in 2005 and the foreign debt burden was dramatically reduced – both through the HIPC Initiative itself and via other parallel debt forgiveness programmes by other bilateral creditors.

This has allowed for fiscal expansion since 2005, but, following the 2008 global financial crisis, copper prices fell again and after reviving around 2010/11 fell further from 2012. As in the 1970s, the Government has tried to sustain higher levels of public spending through external borrowing – but this time on the Sovereign Bond market and has issued US$ 3 billion of Eurobond debt in the last 5 years. In addition, indebtedness to China has spiraled over the last ten years as China has financed large infrastructure projects - especially roads, stadia and airports - which has added to the foreign debt stock. Subsidies have also reappeared, especially for fuel and energy, and the fiscal deficit rose to over 10 percent of GDP in 2015. This has led the current Minister of Finance, Hon. Felix Mutati M.P. to announce in Parliament that Government will need to return to the IMF in 2017 to negotiate a new economic recovery programme.

Zambia stands as one of the most liberalized economies in southern Africa today. This has mainly been due to the removal of product, foreign exchange and labor market controls and the other elements of the “Washington Consensus” policy mix that has been implemented over the last quarter of a century. The impact of this liberalization of the economy differed significantly from the import-substitution economic policies of the Kaunda era, and created favorable market
conditions that was attractive to investment in an open economy where cross-border trade was encouraged. The economic liberalization policy has encouraged massive foreign direct investment – especially in the mines since their privatization in 2000 – but spelt the death knell for many former nationalized enterprises that did not have managers with the entrepreneurial skills needed to take advantage of this new environment.

3.4.4 Sale of State Owned Enterprises and Parastals

With the elimination of protection from foreign competition – the policy that was central to the import substitution economic strategy - virtually all parastatals went out of business unless, like the Dairiiboard which was taken over by the Italian MNC Parmalat, they were taken over by generally foreign investors. By 1997, 80% of the state-owned enterprises had either been sold off or dissolved. The closure of many parastatals in the 1990s, and the consequent loss of many formal sector jobs, together with the evident weakness of ZCCM, weakened the power of the mining trade unions. Thus, the privatization of the mines in 2000 found a much more docile labour movement than the one that played a key role in the downfall of the Kaunda regime and workers, including miners, were prepared to accept much lower real wages and poorer working and living conditions. Indeed, ZCCM had provided education and health facilities in its many mine schools and hospitals as well as operating excellent sports and recreation facilities for its workers and their families. However, virtually all these services and facilities were either handed over the Government or the local councils after privatization or just allowed to become dilapidated.

3.5 Transformed Development: 2000-2015

Since the start of 21st century, following a dramatic recovery in copper prices in the first decade of the century and massive recapitalization of the mines by their new MNC owners, the Zambian economy has performed much better than in any previous period since the first years after independence (when copper prices were also high). Further, following the HIPC debt relief and the creation of more fiscal space in the national Budget, there has been more resources both from the private and public sectors to support the diversification of the economy – especially in the agriculture, tourism and agro-processing sectors. Between 2001 and 2012, the nation achieved average annual GDP growth rates of over twice the population growth rate raising average per capita income for the first time since the early years after independence. However, while the economy has grown, the distribution of the benefits has been far from equitable and Zambia is one of the most unequal countries in the world in terms of income and ownership of wealth. This can at least in part be explained by the lack of investment in education and skills development in recent decades, as well as continued weakness of the trade union movement. Thus, those school leavers who do manage to get work often do so in poorly paid jobs, often casual employment terms.

Further, though the economy has been generally performing well, politically Zambia society has become more fragmented and disunited - especially on tribal lines - as evidenced by an increase in political violence and electoral fraud since the 2001 general elections. This resulting increase in political instability has threatened the growth of the economy and Zambia’s political leadership has also changed several times over the past decade and a half which has caused further political uncertainty.76

After failing to change the Constitution to allow him to stand a third time, Frederick Chiluba hand-picked Levy Mwanawasa to run on the MMD ticket in the 2001 elections. Mwanawasa

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won the vote against Anderson Mazoka, a former Chief Executive Officer of the Anglo-American Corporation and a Tonga by tribe who received widespread support from his home area. There were claims from the opposition that the voting was rigged. Indeed, soon after the election Mazoka took ill and died – with claims that he had been poisoned by the ruling MMD.

Mwanawasa was re-elected for a second term in 2006, winning against Hichilema Hakainde who took over the leadership of the opposition (Tonga-based) party from Mazoka. Despite having won the general election for a second term, Mwanawasa died in France before the end of his presidency in August 2008. Following Mr. Mwanawasa's death, his vice president Rupiah Banda succeeded him to the office of president, but he later went on to lose the 2011 general election by a small margin against another opposition leader, Michael Sata, who had established a splinter party – the Patriotic Front (PF) – from the MMD when Chiluba had chosen Mwanawasa as his successor in 2001. Hakainde also polled well (but lost) in the 2011 election again getting support from his home area in Southern Province but also building support in Western and North Western provinces.

However, like his predecessor Levy Mwanawasa, Sata also died during a trip abroad in 2014 whilst visiting Israel, and he was succeeded by Edgar Lungu, also from the PF, who become the 6th president of the republic of Zambia, a position he holds today after winning the highly contentious August 2016 general elections where Hakainde lost again but by about 100,000 votes out of over 3 million cast. Once again, the voting patterns in the 2016 elections increasingly reflected ethnic politics, despite Zambia being a multiethnic country. Ethnicity has historically been utilized as a key determining factor when deciding when it comes to political leadership and winning general elections in Zambia. Tribal ethnicity has been used either to discredit political competitors from their own ethnic group or to reinforce support from the politician’s
ethnic group. As such, during the last presidential election in Zambia, politicians from the ruling party once again relayed upon using ‘tribalism’ as a weapon to disrepute their opponents, admits other external factors affecting party choice, i.e. (media projections, popularity and economic and political benefits).

CHAPTER 4: Environmental Assessment of Copper Mining

4.1 Copper Mining and Processing

Copper production is not an ecologically friendly activity. The process of removing copper from copper ore varies depending on the type of copper ore and concentration of copper in the ore. From mining and crushing through hydro- and pyrometallurgical processing to filtration, each process of copper production can have substantial adverse effects on air quality, surface and groundwater quality, and the land due to foreign materials introduced or toxic chemical residues left behind (see Figure 5). Some of these ore purification processes are conducted at the mine site itself, while in other instances, they are done at a distance. Copper production, like many other industries in Zambia, is subject to extensive environmental regulation by government ministries and other stakeholders, especially as it relates to air and water quality, materials handling and waste disposal practices, due to the impact it has on both humans and the environment.

4.1.1 Ore Extraction

Copper ore (the bulk of which is sulfide minerals containing only 0.5 to 2.0 percent copper) can be extracted from the earth in several ways. Ore occurring at some depth is obtained by underground mining involving the sinking of vertical shafts into the earth to an appropriate depth to reach the copper ore layers, and then driving horizontal tunnels into the ore strata. Ores nearer the surface can be much more cheaply accessed through open cast mining by quarrying or digging out the ore after removing the shallow surface layers (called the overlay). As this is a much cheaper extraction method, globally, the bulk of copper extraction is through open cast mining.79

Once the ore is removed from the earth, it is necessary to process it to obtain 99.99% pure copper. This requires treating the copper ore through a series of processes to separate the copper content (often less than 0.6%) from the surrounding rock, called “gangue” (and small proportions of other minerals such as gold, silver, iron, nickel and uranium).80

### 4.1.2 Ore Concentration–Separating Minerals from the Gangue

The first processes are physical and involve the crushing and grinding of the ore and then concentrating it through a process called “froth flotation.” Once crushed, the powdered ore is mixed with a paraffin-like oil that makes the copper mineral particles water repellant. It is then fed into a bath of water containing a foaming agent. Jets of air are forced through the tub, and the water repellant copper mineral particles are picked up by the bubbles in the foam and rise to the surface forming "froth." The unwanted waste rock (the gangue) falls to the bottom of the bath. The foam is skimmed off the tub surface, and the "enriched ore" (now containing about 25% copper) is taken for “roasting.”

4.1.3 Smelting to form “Matte” and “Blister” Copper

The next processes are chemical and involve the smelting or heating to high temperature of the enriched ore with fluxes such as silica and limestone. The ore melts and reacts with the fluxes, while most of the impurities form a slag that rises to the top of the smelter and can be easily removed. The molten ore is drained off from the bottom of the foundry and is a mixture of copper sulfides and iron sulfides called “matte.”

The liquid matte is then oxidized by passing air through it to form “blister copper” (which is 99% pure copper) and sulfur dioxide. The term “blister” derives from the fact that the process produces bubbles of sulfur dioxide on the surface of the copper. The blister copper is then cast into anodes ready for the final stage of the process—electronic refining through the process of electrolysis.

4.1.4 Electronic Refining to Form Pure Copper

In electric refining, the blister copper anodes are immersed in an electrolyte solution (a solution that conducts electricity) containing copper sulfate and sulfuric acid. Pure copper cathodes are arranged between the blister copper anodes, and a current of over 200A is passed through the solution. Under these conditions, copper atoms dissolve from the (relatively) impure anode to form copper ions (by giving up two electrons). These ions migrate through the electrolyte solution and recombine with electrons on the cathode to form a new layer of pure copper atoms on the cathode. Gradually the anode is eroded, and the cathode grows. After that, the cathodes are removed, and the pure copper (99.99%) is scrapped off. Impurities in the blister copper anodes either dissolve in the electrolyte solution (such as iron and nickel) or fall to the bottom as sludge from which valuable minerals such as gold, silver, and platinum are removed.

4.1.5 Leaching
Apart from underground and open cast mining, some mines extract copper ore from the earth by passing dilute sulfuric acid through the layers of gangue containing the copper ore. The slowly percolating acid dissolves the copper to form copper sulfate, and the copper is then recovered by electronic refining described above. This method of ore extraction uses much less energy than traditional mining (e.g. no energy required to super heat the smelters), and no waste gasses like sulfur dioxide are given off. However, there is the apparent danger of contaminating ground and surface water systems.

4.1.6 Recovery of Copper from Old Tailings of Gangue

Where historic waste in the form of “tailings” from past mining activity is now found to have “economic” quantities of copper content using 21st-century technology, some copper is extracted from these historic tailings for further processing. This is occurring at the “Black Mountain” tailing site in Kitwe in the Copper Belt Province.
Copper production is not an ecologically benevolent action. From mining and crushing through hydro- and pyrometallurgical dispensation to purifying, copper production can have important hostile influences on air quality, surface and ground water quality, and the land (see figure 7 above). While these influences can be severe when the ingredients handled include poisonous or hazardous substances (e.g., Copper ores with a comparatively high concentration of arsenic). Thus, uncontrolled copper smelting processes affect the quality of air through the emitting large quantities of particulate matter, trace elements, and sulfur oxides, which can have adverse effects on human health. Equally, land is changed significantly because of open-cut mining with large

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pits being created from mining processes resulting in waste rock being generated from. Adverse water quality impacts are caused primarily by land disposal practices that fail to contain wastes, by run-on and run-off controls that are inadequate to prevent surface water from flowing through impoundments, or by groundwater infiltrating surface impoundments. In Kitwe, Mufulira, Chingola and Ndola, where some casting takes place, yellow fumes produced by sulphur oxide can be seen in the air and respiratory difficulties are not unusual. In Kabwe town, the town has experienced has a long-standing issue of lead poisoning and, notwithstanding the scaling down of lead and zinc mining in the area.

4.2 Regulatory Environmental Laws and Copper Mining in Zambia

This section will examine whether Zambia has built the necessary legislative framework and administrative capacity to effectively regulate, protect and implement environmental conservation measures, especially in areas affected by large-scale copper mining operations. It will also examine the roles different stakeholders play within the copper mining industry and the significance of stimulating environmental protection awareness among all stakeholders. This is important especially now, when most countries are attempting to attain sustainable development. This commitment includes working to achieve four of the United Nations’ Seventeen Sustainable Development Goals of (I) good health and wellbeing, (ii) clean water and sanitation, (iii) sustainable cities and communities and (iv) responsible consumption and production, all require sound environmental protection and management practices for their attainment.

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82 surface waters include the various terms of water occurring on the surface of the earth, such as streams, rivers, ponds, lakes, etc. Groundwater is water that flows or seeps downward, saturating soil or rock and supplying springs or wells. The upper level of this saturated zone is called the water table. Aquifers are underground water sources large enough to be used for public water supplies.

Section 4.2 1 Ministries and Departments Pertinent to Environmental Protection in Zambia

In this investigation of global copper production and how copper mining results in environmental degradation in Zambia, we explore “environmental governance,” a term that denotes the set of regulatory procedures and organizations by which political players affect environmental activities and outcomes. Pertinent to this discussion are key elements such as the “political-economic relationships”\(^84\) that governments personify, and the “characteristics, activities, and outcomes”\(^85\) that form the nature and efficacy of environmental regulation.\(^86\)

Figure 7. Organogram of Environmental Management Institutions in Zambia \(^87\)

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\(^85\) Ibid. 1. P 575

\(^86\) Ibid. 1.P. 578

There are several governmental organizations and agencies tasked with addressing environmental management issues across different sections of society in Zambia, most notably the Ministry of Lands, Natural Resources and Environmental Protection, previously known as Ministry of Tourism, Environment and Natural Resources (MTENR). This ministry is the focal point where all matters of environmental conservation and management in Zambia are addressed. The effectiveness of the Ministry depends on capacity and performance of several departments and agencies housed under this ministerial body that aim to address the significant problems in the current environmental governance of Zambia.

The Department of Environment and Natural Resources Management is the arm of the ministry responsible for formulating and implementing policy designed to attain sound ecological and natural resources management. It researches and coordinates different methods of responding to any adverse environmental impact that may occur in the country, such as the pollution of rivers. This was the case in 2005 when the Kafue River was contaminated with sulfuric acid and other toxic chemicals by Konkola Copper Mines. The department has also been authorized to manage, coordinate, monitor and assess the actions of other policymaking agencies for their environmental impacts on behalf of the government.

The Zambia Environmental Management Agency (ZEMA) investigates the potential negative impacts of any developments—including copper mining developments—through conducting environmental impact assessment (EIA) protocols and the development and application of environmental governance guidelines across a broad variety of sectors. It has been responsible

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89 Ibid.
since its inception in 1992 (when it was called the Environmental Council of Zambia) for undertaking EIAs and issuing environmental licenses to authorize the operation of development activities in a sustainable manner and to ensure that these developments remain environmentally sustainable.\textsuperscript{92}

The Ministry of Mines, Energy and Water Development\textsuperscript{93} is responsible for a broad range of issues including environmental conservation measures related to the mining sector and the protection of the nation’s ground and surface water resources. It is also responsible for the development, supervision, and enhancement of environmental standards and enforcing job safety measures in the mines. This ministry was the result of a merger between two departments to oversee two major environmentally-related areas: mineral resource management and water affairs. The Department of Mines Safety attempts to ensure that mine safety regulations are observed in the mines to protect the health and safety of the mines’ workforce per the mine health and safety laws and regulations that it promulgates.\textsuperscript{94} The Department of Water Affairs is tasked with conserving the nation’s surface and groundwater resources and, in partnership with local municipalities, to supply potable water to homes and businesses. Surveillance of the water quality in Zambia’s main surface water bodies (lakes, rivers and streams) as well as in the nation’s extensive ground water aquifers together with building awareness related to the

\textsuperscript{92} ZEMA, formerly known as the Environmental Council of Zambia, plays a significant role in environmental governance in the nation; it has been designated by law to “take all measures necessary and ensure sustainable management against ecosystem degradation, with capacity equip to maintain natural resource protection and management in Zambia.” Lindahl, J. (2014). Environmental Impacts of Mining in Zambia: Towards better environmental management and sustainable exploitation of mineral resources. Stockholm: Geological Survey of Sweden.


\textsuperscript{94} The Ministry of Mines, Energy, and Water Development was formed by merging two former government ministries under one ministerial body. The past abolished ministries include the former Ministry of Mines and Mineral Development (MMMD) and Ministry of Energy and Water Development (MEWD).
sustainable use of Zambia’s water resources are but two of the objectives of the department, especially as related to industrial mining activities in the country.\textsuperscript{95}

4.2.2 Environmental Legislation and National Guidelines in Zambia

The Zambian laws and guidelines regarding environmental conservation are comparatively up to date, and their development span a period of three decades across various ministries. In 2009, a major review of the actual implementation of Zambia's environmental conservation policies led the government to launch a new National Policy on the Environment (NPE), intended to condense all the existing laws and regulations in the country into a harmonized set of policies. However, like most cases in Zambia, the main problems lie not in the policy or legal framework but rather in their implementation. Due primarily to budget constraints, the government has failed to effectively implement the NPE, and the sustainable management of the environment and exploitation of its natural resources remains elusive.

Currently, the principal and fundamental piece of legislation that guides and regulates environmental management and administration in the nation is the Environmental Management Act (No 12 of 2011).\textsuperscript{96} The Act contains modern features and institutional arrangements related to the conservation of natural resources and environmental protection. It was through this act that the nation’s principal governing body for environmental management, formerly known as the Environmental Council of Zambia, became referred to as the Zambia Environmental Management Agency (ZEMA). Salient features of the act include:

1. Prevention of contamination and ecological degradation, including that from historical mining operations.

\textsuperscript{95} Ibid. 8.
\textsuperscript{96} The Environmental Management Act (No 12 of 2011).
II. Provision of cooperative ecological governance grounded in the values of the shared heritage of both present and future generations.

III. Development of environmentally sound strategies, policies, and programs aimed at allowing sustainable use of natural resources for economic and social development while enforcing environmental management regulations.

The environmental laws in Zambia have been more efficiently implemented under the new Act than they were under its predecessor, the 1990 Environmental Protection and Pollution Control Act and its 1999 Amendment (No 12 of 1990 and No 12 of 1999). However, parts of the old guidelines and regulations are still being adhered to under the new law, because the new Act covers only specific damage to the environment that is produced by contamination or land use. The other issues are addressed in separate laws and regulations, and a high level of cooperation is required between other government departments, agencies and local municipalities for their execution if sound ecological measures are to be implemented in Zambia. These regulations include:

   I. Waste Management (SI 71 of 1993)
   II. Water Pollution Control (SI 72 of 1993)
   III. Pesticides and Toxic Substances (1994)
   IV. Air Pollution Control (SI 142 of 1996)
   V. Environmental Impact Assessments (SI 28 of 1997)
   VI. Hazardous Waste Management (SI of 2001)

Some of the salient features of the 2011 Environmental Management Act, in its attempt to support and strengthen the efficacy of future environmental conservation efforts, relate to ensuring that the policies and measures that are adopted continue to work in the face of varying
socio-economic situations.\textsuperscript{97}

4.3 Stakeholders’ Effects on Environmental Conservation

The copper mining industry has many stakeholders; for this research paper, key stakeholders have been identified that represent a wide range of interests. Their role is to guarantee that their respective agendas are recognized and their benefits and wishes promoted. Apart from the Government (including municipal councils) and the private mine owners themselves, these stakeholders include the church, NGOs and civil society, the Mine Workers Union of Zambia (MUZ), the judiciary and the media. Each of these stakeholders plays an instrumental role in influencing the operations of the copper mining industry, the distribution of its benefits and the mitigation of the negative environmental impacts of copper extraction and ore processing activities set out in section 4.1 of this paper. Some of these stakeholders, like the church, civil society and NGOs act as defenders of the environment and the communities affected by adverse impacts on it. They do so by relentlessly holding government to account to perform its statutory duties to its citizens under such laws as the 2012 Environmental Management Act and pressurizing the mining companies to execute their commercial operations to minimize and mitigate any adverse environmental externalities arising from their activities in the wider interest of all.

An example of this occurred in 2011 when the Supreme Court of Zambia upheld a High Court verdict which found Konkola Copper Mines (KCM) guilty of water pollution in 2006 which poisoned thousands of Cingula residents. The judgment was delivered in favour of victims who had died after having ingested contaminated water from the Kafue River, which had been poisoned by mining waste discharged into it by KCM. It took five long years of the villages

\textsuperscript{97} Ibid.
working hand in hand with the NGO that sued the mining company before KCM was fined two million dollars in damages. The High Court made the judgment and set the damages due to KCM’s “gross recklessness.”

The role of civil society and NGOs this case was fundamental, as they further lobbied the government and the mining industry to strengthen their arrangements to protect the environment and the mining communities affected by copper production. The result was the strengthening of the policy and legal framework as already referred to in section 4.2 above.

Other vital stakeholders in environmental conservation include the media, which serves to inform the public on all subjects pertinent to their health, well-being, financial status and ecological position, by acting as watchdogs of the actions of the mines. On the other hand, the media, either state-owned or independent, can be aligned with the government and/or the interests of the mining MNCs and broadcast or publish what is pleasant from the MNCs’ or Government’s viewpoint (e.g. publicizing “Corporate Social Responsibility” spending by the mines while downplaying any news of violations of statutory limits to air or water quality). This underlines the need for reputable sources of independent media which also have the capacity for good investigative journalism for the public to be properly informed about the true costs and benefits of copper mining. Unfortunately, with an increasingly factionalized and tribal political environment, most “independent” media are “aligned” to the Government or the opposition and their credibility is undermined. Further, the capacity for well researched investigative journalism is also limited.

99 Ibid.
The church’s role in advocating for social justice is realized in the context of this paper by it playing a reconciliation role, facilitating dialogue between the parties and communities affected by contaminants arising from the mines and the mines when they are accused of causing this injustice. Its key role is to act as a mediator.

Finally, the Mine Workers Union of Zambia’s role is to promote the interests of their members who are employees of the mines by championing the cause of fair salaries for their members and to secure better and safer working conditions in line with the state regulations on working environment conditions. As already observed in Chapter three however, their power has become greatly restricted from its zenith in 1991 as the hardships of structural adjustment and privatization has cowed their members’ appetite for any militant action. Thus, in practice, the extent to which they can affect the behavior and decisions of the mine owners is limited and regularly the interests of the mines take precedence over those of their workers.

**4.4 Zambian Copper Mine and Smelter Pollutants**

While air pollutants do arise from ore extraction activities – especially open cast mining – and ground and surface water contamination occurs wherever leaching takes place or where water is pumped from deep underground mines, the primary source of pollution in Zambia’s mining sector is smelters. Post 2001, most of the formerly nationalized and unprofitable copper mines under the Zambia Consolidated Copper Mines Limited (ZCCM) have been sold off, and the new investors have revitalized the mines through huge injections of capital and the scaling up of production to make returns on their investments. However, given the arguments set out in Chapter One of this paper relating to how intrinsically the mining MNCs are tied into the global capitalist system where the governing logic is the maximization of returns to shareholders and senior managers and the minimization of costs, protection of the environment is most likely to be
undervalued, especially if mitigation measures are costly and local regulatory watchdogs can be bribed or otherwise “internalized” into seeing things from the mine owners standpoint. Regardless, several serious ecological consequences are clearly linked to operating a copper mines and smelters and the significant ones are considered here.

4.4.1 Air Pollution Impacts: Sulfur dioxide (SO2)

The chief cause of sulfur dioxide contamination is from the roasting and purifying of copper-bearing sulfide minerals in the Copper belt. The principal ore is chalcopyrite (CuFeS2), and the first phase in most procedures is roasting or smelting the ore in the open air, which oxidizes roughly all the copper and generates sulfur dioxide. The actions at Nkana smelter generate sulfur dioxide and dust. Mufulira copper smelter is another principal source of sulfur dioxide air pollution. Both Nkana and Mufulira smelters adversely affect the surrounding communities with poor air quality. Calculations from those areas have revealed a sulfur dioxide concentration of 500-1000 μg/m3, significantly surpassing the nation’s regulation limit of 50μg/m3. The population of nearby residential towns in the Kitwe area are daily exposed to high SO2 concentrations, as they are near the smelters. Children, women and the elderly are particularly badly affected. The poor quality of the air increases the incidence of respiratory disease-related health problems such as asthma and lung infections among the general inhabitants in those areas, especially those with extremely high exposure to SO2 because they live close to, and downwind of, the largest source of the SO2 emissions - the smelters.

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101 Ibid. SGAB and others, 2005 at P.12
4.4.2 Water Pollution Impacts

Water contamination in Zambia is mostly created by liquid waste from mining actions that is released into water bodies, and nutrient-rich runoff from farming lands in the Kafue and Mazabuka areas. In the Copper Belt Province, many groups do not have access to steady piped, purified water from the local municipalities; rather, they rely on boreholes which pump up ground water or on streams, rivers and water bodies for their households and livelihoods water requirements. Copper production growth poses a hazard, as water pollution arises from leaching, mining dump runoff, leakage from tailings dams and unintended releases of raw wastewater containing acidic liquids from small particles of good rock (silt or sediment). The valley tailings dams have been shaped into huge ponds containing acidic levels of sediment and it is this residue that has created environmental problems over time that affect local communities.

The noteworthy contributors to metal contamination are Nchanga, Nkana, and Konkola mining operations. In Kitwe town, the Konkola Copper Mine (KCM)’s Nchanga smelter has been the primary source of pollution of the Kafue River, with reported cases of a few of KCM’s pipelines having discharged significant amounts of acidic fluids into numerous tributaries (Chingola and Mushishima streams) of the Kafue, one of Zambia’s major rivers. The Environmental Council of Zambia (ECZ)’s certified statement in 2006 highlighted incidents of water pollution, finding KCM liable for having negligently polluted the Kafue River, with reports at the time having shown liquid contained 1,000% more copper, 77,000% more manganese and 10,000% more...
cobalt than recommended levels, creating grave consequences on the environment and human life, with many victims having reported suffering severe digestive and organ problems.\textsuperscript{105}

Such unacceptable releases of polluted waste water are not the only difficulty created by copper mining production. The Ministry of Agriculture and Co-operatives has further stated that populations living near the Kafue River have been economically affected by the pollution of the Kafue. Officials from the ministry have claimed that “agricultural farmers, i.e. Hippo village communities, suffered economic effects from the contamination of the Mushishima stream, being the only source water, thus affecting over 100 households in the village, which are all small scale farmers”.\textsuperscript{106} Those living near KCM’s Nchanga plant have been the victims of a similar fate, because residues and sludge from the tailing dams have overflowed onto cultivated areas, contaminating the soil, thus rendering the land infertile, preventing agriculturalists from cultivating food products. Losses incurred by farmers was estimated to total K100,300,000 (£12,641) in lost income during 2005 alone.\textsuperscript{107}

4.4.3 Land and Soil Pollution Impacts

Copper mining, both small and large scale, can create tremendous ecological devastation and squalor, rendering land unfit for either human or animal life through the degradation of the topsoil.\textsuperscript{108} In the copper mining areas of the Copper Belt Province, the buildup of metals in the topsoil has been a direct outcome of wind-borne dust elements blown from the mines, supplemented by other fallout contaminants from the copper smelters. It must be noted that the soil in the natural environment of the mining areas has been tested and naturally contains some

\textsuperscript{105} Quoted in A. Fraser and J. Lungu, \textit{For Whom the Windfalls? Winners and Losers in the Privatization of Zambia’s Copper Mines}, 2006
\textsuperscript{106} Ibid.
\textsuperscript{107} Letter from Phillip Simbule (District Agricultural Coordinator, Chingola District) to the Senior Legal Council, KCM, 17 January 2007 (reference no15/DACOCN/3/28/1)
\textsuperscript{108} Ibid.
traces of metal elements within subsoil structures (e.g. in many areas chromium and nickel are found in greater concentrations than the average found underneath the surface soil layer 70-90 cm).\textsuperscript{109}

However, in mining areas, extremely high metal element concentrations have been found, far above any naturally occurring levels, gravely threatening the environment and local communities around them. This was established in a full scholarship on soil pollution conducted on the Copper Belt.\textsuperscript{110} The scholarship comprised of thorough field investigations in five Copper belt mining towns that included Mufulira and Chingola, and to a smaller degree with Kalulushi, Chililabombwe, and Chambishi.\textsuperscript{111} The samples collected revealed that many contained extremely high concentrations of metal elements which were clearly linked with mining area contaminants, in contrast with the concentrations of these metal elements occurring naturally in non-mining areas (see Figure 8).\textsuperscript{112}

It is hard to ascertain how the study’s original estimates were made of the economic and financial impact of the use of these contaminated soils for agricultural livelihoods of the local population. However, in the case of these Copper belt towns, subsurface samples demonstrate that the surface soil layer contained at least “ten times more and at other instances, records indicated an astonishing fifty times more soil pollution in more or less the entire Copper belt.\textsuperscript{113}

\textsuperscript{109} ibid
\textsuperscript{110} ibid SGAB and others, 2005.
\textsuperscript{112} ibid. 26
CHAPTER 5: ANALYSIS AND DISCUSSION OF FINDINGS

5.0 Introduction

This final chapter examines and discusses the results of the study on the effects of copper production on the environment and local communities in Zambia, and how the environment has changed because of mining and smelting operations. Using a political ecological framework with that of a multiple scale analysis, the discussion is based on the local impact on the Copper Belt Province.

5.1 The Impact of Large Scale Copper Production on the Environment

Zambia is home to one of the world’s largest sources of copper ore, geographically located on the border between Zambia and the Democratic Republic of Congo (DRC), in a region known as the Copper Belt Province. Since independence, the mining industry has been the economic backbone of Zambia’s development, with the mining sector contributing significantly to the
nation’s overall growth. From the country’s mining sector, the Zambian Government gathers revenue in the form of mineral royalties, payments, payroll and corporate taxes and other peripheral benefits that are used for developmental schemes and public service provision in the health, education, agriculture, infrastructural development, manufacturing and construction sectors. Furthermore, the industry is one of the principal employers in the country, directly and indirectly providing employment opportunities to thousands of people across the nation, given the huge foreign investments that have invigorated Zambia’s mining sector since the beginning of this century. In 2015 alone, Zambia produced 710,860 metric tons of copper, generating foreign revenue worth over US$6.9 billion.\textsuperscript{114} Heavy investments in the sector by foreign mining companies have been made following the privatization of the copper mines from the year 2000, after three decades of nationalization and lack of re-investment. Since then, encouraged by a revival in copper prices, mining MNCs have invested over US$10 billion in the sector, revitalizing Zambia’s copper production to historically high levels. Copper production increased from about 250,000 tons in 2000 to over 750,000 tons in 2013.\textsuperscript{115}

However, taking a wider view of these developments, while they suggest great news for Zambia from its mining sector, the reality is that most Zambians continue to incur negative social, health and environmental impacts from its operations. The “resource curse” of copper production is evident, especially by citizens who live in the Copper Belt Province. The acceptance over the last quarter of a century of neoliberal economic policies, centered on private sector-led growth and an open economy that is welcoming to foreign direct investment, called for a complete reorientation of the laws and policies of the nation. These, \textit{inter alia}, conferred generous tax breaks and incentive packages for the mining companies which were detrimental to the nation’s

\textsuperscript{114} Ministry of Finance, Government of the Republic of Zambia, 2015 Economic Report, p.7 and p.48
public finances and hence public service delivery and development outcomes. For instance, in the period of 2000–07, on average, the mining industry paid less than 0.1% of GDP to the government by way of taxes and royalties, although accounting for about 6.2% of GDP. This truncated contribution was due to the generous mining tax regime as well as transfer pricing and other profit shifting arrangements engaged in by the MNCs to reduce their exposure to Zambian tax obligations.

All of Zambia’s copper mines are now owned by multinational mining companies who are intricately enmeshed in the global capitalist system and whose overall objective is to maximize profits and financial returns for their shareholders. From a political ecology viewpoint, the conduct of mining activities on the Copper belt is inescapably driven by the precepts of a neoliberal economic paradigm and the dictates of the international financial/capitalist system.

In line with the above viewpoint, the ability to wield political influence plays a crucial role in what measures are taken to promote environmental conservation and the efficacy of these measures.116 Politics includes the ability to secure and use power to attain one’s advantage and objectives in struggle with others having alternative goals and values. Authority in a political ecology context can be understood as “the skill of a performer to regulate their own contact with the environment and the interface of other performers with the environment”117

A prominent result from the multiple scale analysis is how the national government has radically impacted land use by altering who has access to what land in Zambia, through the enactment of various legislation and policies. The nature of land tenure arrangements as understood in the

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116 Per Bryant and Bailey, 1998:39
117 Ibid.
minerals and mining legislation of Zambia gives the State the right to lands with minerals.\textsuperscript{118} Per Turner,\textsuperscript{119} “Two related classes of value can be made from land and land capitals. First, the value characterized by the floods of advantages that they make for those holding rights to them, and the price that market forces assign to them.”

The government possesses the authority to regulate and make choices on land use and land ownership in discussion with other performers (i.e. mining companies, local communities, traditional rulers and officeholders) with respect to mining rights. The exercise of power by actors is highly likely to create change in the decisions and policies that Government makes.\textsuperscript{120} Thus, the enormous power which the mining MNCs have arising from their ability to mobilize large capital resources and create employment for thousands of Zambians confers on them the ability to interact with Government in ways that favours their interests even at the expense of wider development objectives. Such unequal power between parties is used to create and sustain unfair relations between them, resulting in struggle and conflict owing to dissatisfaction over the sharing of the proceeds of the nation’s mineral wealth and the lack of effective environmental management when it conflicts with the commercial interests of the MNCs and their ability to dominate in the debate over the control of resources.\textsuperscript{121} In Zambia, particularly with mining developments on the Copper belt, mining operations by the MNCs act as an instrument for the government to exploit for its own political plans, as they assert the right to bestow mining franchises to particular mining companies in return for relatively paltry taxes and royalties.

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\textsuperscript{118} All land in Zambia is vested in the president, in trust for the people of Zambia, under the Land Act of 1995, Chapter 184 of the Laws of Zambia.
\textsuperscript{120} See Bryant and Bailey, 1997 at P:39
Applying the multiple scale analysis to mining on the Copper belt (see Figure 10), it was observed that stronger actors in the copper mining sector, such as government leaders, mining companies, the IMF and World Bank, are wielding their disproportionate power to achieve their own agendas at the expense of the environment and weaker performers—especially local communities in the mining towns and the surrounding areas. Each interest group uses its power derived from the financial resources, tools and skills it can muster, to maneuver and advance their own agenda. For instance, mining companies use their ability to mobilize enormous capital amounts to obtain access to the nation’s copper ores while Government supplies them with generous inducement packages to do so.

Developing countries like Zambia, who want to sustain economic growth and provide employment for their people, are led to believe that they must offer attractive incentives in what has been termed a “race to the bottom.” These incentives often include turning a blind eye to negative environmental impacts or agreeing to reduce their liability for doing so, as these countries must also operate and survive in a global economy driven by private profits and highly mobile capital flows.

Further, the exploitation of a country’s natural resources by foreign MNCs is inevitably a key source of environmental and societal struggle. This is particularly the case where local people are discontented over the arrangements put in place to determine how the income and wealth produced by the exploitation of their natural resources is distributed but are the ones who face the brunt of all the negative environmental impacts. They are left them with little material benefit but bear the greatest environmental costs.¹²²

<table>
<thead>
<tr>
<th>Band/ Association</th>
<th>Position in political economy</th>
<th>Root of Authority</th>
<th>Benefits and Objectives</th>
<th>Methods of achieving Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Communities</td>
<td>Partially disempowered in practice but not in theory</td>
<td>Community activism, protests,</td>
<td>Healthy environment, viable livelihoods and communities to live free pollution</td>
<td>Protests, vandalism, environmental preservation communities (at basic level with limited outcomes)</td>
</tr>
<tr>
<td>Ministry of Lands, Natural Resources and Environmental Protection</td>
<td>Publicizing information regarding environmental management and pollution control</td>
<td>Fundamentally influential, architects of strategies, executioners of ecological management and growth ventures, distribute grants.</td>
<td>Regulator of mining reserves, admittance to all Copper reserves, collect incomes, encourage preservation efforts in form of public awareness.</td>
<td>Construction of strategic development guidelines, inscribe criminal penalties for breach of laws, increase cooperation with the global investor partners for funding</td>
</tr>
<tr>
<td>Department of Environment and Natural Resources Management</td>
<td>Regulate and frame strategies, award mining contracts, Acts as an Intermediate between mining companies, agencies and native communities on environmental conservations efforts.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Ministry of Mines, Energy and Water Development</td>
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<td></td>
</tr>
<tr>
<td>Mining Companies</td>
<td>Private investors and collaborators with government, financial brokers and network influential connections</td>
<td>Government influences, global capital, financial investment resources (Technology, access to markets and machinery)</td>
<td>Maximize the return on capital, exploitation of resources through direction of investments, generate profits.</td>
<td>Develop strategic guidelines towards wealth generation, implement mining operations, scientific research,</td>
</tr>
<tr>
<td>IMF and World Bank</td>
<td>Partners with the with ruling state administration, exercise authority over government due to monetary incomes</td>
<td>Government connections, international community,</td>
<td>Fiscal Stability, lending, surveillance capacity development</td>
<td>Provide technical assistance and training to member countries design and implement economic policies that foster stability and growth. Provide loans to member countries experiencing actual or potential balance of payments problems Oversees the international monetary system and monitors the economic and financial policies</td>
</tr>
</tbody>
</table>

Figure 9: Interest Associations in Copper Mining in Zambia
5.2. Mining Pollution Impacts at the Local Level

The findings of this research corroborate the argument that mining operations on the Copper belt province in Zambia have resulted in an increase in the number and scale of environmental and human quality of life problems.\(^{123}\) In the present study, specific negative impacts of mining processes upon the environment were recognized in the investigation that included; substantial and health threatening land, water and air contamination.

On the matter of land deprivation, vast areas of land have been cleared to accommodate open cast/surface mining and to store (especially in the form of tailing dumps and dams) the waste material from ore extraction and processing activities. In the case of soil fertility and water quality, lands intended for farming and pastoral activities have likewise been ruined through a poisoning of soils and water sources because of the mining activities negatively affecting local community livelihoods based on agriculture. Soil pollution remains a huge issue, given that land is a stationary asset. Hence land pollution contaminants remain in the same area polluting the surrounding ecosystems thus creating an imbalance, deforestation and the obliteration of wildlife environments because of large scale copper mining. Copper mining on the Copper belt involves mineral exploitation that comprises of underground pits and the demolition of rocks using ammunition which could create extreme damage to the environment and release toxic dust into the atmosphere. Further damage and removal of the vegetative cover has contributed to a large areas of soil erosion and extreme run off water and flash flooding during the rainy season.\(^{124}\)

Air pollution is another environmental problem prevalent in the Copper belt mining areas, arising from the use of explosives in quarrying and drilling activities as well as the release of toxic gases – principally sulfur dioxide – from the copper smelters. These actions have created highly

\(^{123}\) See SGAB and others, 2005.
contaminated atmospheric air in the areas surrounding mining activities, severely jeopardizing human health and well-being. The use of explosives also creates dangers to structures and there are reported cases of mining operations at Konkola Copper Mines in Kitwe using piercing and blasting that had caused cracks and the failure of structures built in the surrounding community.\textsuperscript{125}

Contamination of surface and groundwater resources in the research area was a clear outcome of the mining operations undertaken. The Mushishima, Muntimpa and Chingola streams and the mighty Kafue river itself are all contaminated. These water courses are stained a cloudy brown color as their waters mix with chemicals originating from effluent spilled by Konkola Copper Mines (KCM) that contains suspended solids (containing poisonous substances such as mercury and sulphur).\textsuperscript{126} The result of pollution of water sources has endangered human life and wellbeing as well as that of pastoral animals and wildlife. The outcome of this water pollution has affected both the economic livelihoods and the domestic households of people, especially those residing in rural areas adjacent to, or downstream from, mining areas without access to running treated pipe water, that are left to travel long distances in search of potable water for themselves and their animals.\textsuperscript{127}

\textbf{5.3 Conclusion and Recommendations}

\textsuperscript{125} Ibid.
\textsuperscript{127} Ibid.
There is a growing necessity for the Government of Zambia to harmonize mining and ecological legislation and strategies to promote both economic growth and to safeguard social-ecological development. However, to get to that point, the following recommendations are proposed.

The impacts of copper mining upon the environment in Zambia are very conspicuous. Although there have been some achievements thus far, a lot remains to be done to make more substantial progress. Future development policies and plans ought to promote economic growth but also strengthen the capacity to protect the environment by stakeholders - including the Government administration - to enhance the efficacy of ecological conservation efforts, ensure strict compliance with environmental standards and enforce criminal penalties against mining proprietors who are found to be in breach of the law.

Secondly, there is a need to strengthen the management of ecological reporting systems, and to devise effective environment impact assessment tools. The existing administration and management procedures fall short, and there are numerous discrepancies in the environmental management systems (EMS) under the supervision of ZEMA used for shadowing the sector. This will allow regulators to consistently uphold national standards to curb pollution that terminates livelihoods and destroys the environment in mining areas. Without effective monitoring systems, violations will continue to be made with relative impunity by mining companies. Thus, ZEMA should be able to effectively monitor not only the mining proprietors’ arrangements and procedures for mitigating the negative environmental impacts of their activities but also ensure that these procedures are indeed effective in reducing to a minimum the environmental footprint of the operations. Furthermore, there is a need for better technical and geoscientific data, and training for personnel on environmental management that is relevant and practical for everyday work and application. Such practical trainings should focus on specific topics, i.e. waste
management spill prevention and monitoring, reporting and evaluation, as well as emergency evacuation procedures.

This investigation was based on one theoretical concept, that copper production combined with the profit seeking / cost minimizing behavior of multinational mining companies who operate in the global capitalist system - directly affect the specific forms of Zambian mining activities which in turn has significant negative environmental and social impact, resulting in environmental degradation at the local level. This theory has been tested in line with the findings presented through economic and environmental indicators and applied in the current analysis. The current legal requirements are not sufficient to ensure ethical mining practices when discharging waste from extraction or smelting processes, resulting in the negative social and environmental impacts associated with copper mining.

This leads to the conclusion that there is an urgent need to enhance and implement strategies, systems and legislation which allows for greater transparency in the mining industry about the procedures used to mitigate negative environmental impacts, the quantitative and qualitative results of these procedures and the steps required to be taken as soon as compliance levels wane. The full involvement of the government, local communities, non-governmental organizations, the mining companies themselves, and other stakeholders engaged in the mining industry, is needed to comprehensively address the social-environmental impacts of mining operations. This should be done by designing and implementing holistic and practical environmental protection legislation that is backed by institutions and resources that can effectively implement this legislation to attain genuine mitigation of all undesirable environmental and ecological outcomes of mining activity at the local (and wider) levels.
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46. Map B shows the major Copperbelt mining towns, as geographically located on the map of Zambia. The map was accessed from https://www.csrm.uq.edu.au/events/smi-seminar-chinese-mining-in-africa-its-global-controversy on 10/10/2016


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