APPRAISAL OF ZAMBIA'S ARTISANAL AND SMALL-SCALE GOLD MINING SECTOR

WEBBY BANDA

OCTOBER, 2020
Artisanal and Small-Scale Mining (ASM) in Zambia is increasingly becoming an important source of employment for many who cannot get jobs in the formal sector. This sector is perceived by the Government of the Republic of Zambia (GRZ) as a potential source of tax revenue. ASM in Zambia has been habitually focused on the gemstone mining sector. However, the recent spate of gold discovery is changing this narrative. This study focused on appraising Zambia’s Artisanal and Small-scale Gold Mining (ASGM) sector encompassing technical, social, environmental, safety and health issues. The study was undertaken in three districts, namely, Mwinilunga, Rufunsa, and Lusangazi.

The results of this study show that Zambia’s gold fiscal policy does not differentiate between Large Scale Gold Mining (LSGM) and ASGM operators. It was further observed that most pieces of legislation governing LSGM apply in the same way to ASGM except legislation on licensing issues. It has been learned from the study mining areas that ASGM comes with several benefits including income generation, poverty reduction, employment opportunity and linkages to other sectors. However, it has also been deduced that ASGM in these areas has negative effects including crime, child labour, prostitution, land degradation, the spread of diseases, pollution, siltation of rivers etc. in this study, an ASGM plan was developed and proposed for Zambia to address several issues of the sector. The strategy utilizes the concept of cooperatives to promote poverty alienation and macroeconomic stability.

In going forward the study recommends the following:

(i) The government should consider increasing geological mapping and exploration in areas claimed to have gold. This process will ascertain the quality and quantity of reserves and improve decision making.

(ii) The government should consider allocating 10 percent of the proceeds from mineral royalty to the Geological Survey Department (GSD) to ensure sustained financing of prospecting and exploration activities.

(iii) The government should support the formation of cooperatives through engagement with communities hosting gold resources.

(iv) The government should actively finance ASGM cooperatives. It should seriously contemplate adding an allocation of ASGM cooperative financing in the national budget.

(v) The government through the Ministry of Commerce Trade and Industry (MCTI) should establish trade hubs or market centres in remote ASGM areas to facilitate the buying of gold by Zambia Consolidated Copper Mines - Investment Holding (ZCCM-IH).

(vi) The government through the Ministry of Commerce Trade and Industry (MCTI) should facilitate the linkage of the cooperatives to the external market.
(vii) The government should consider designing a sector-specific fiscal regime that supports the growth of the ASGM sector.

(viii) The government should engage the University of Zambia (UNZA), School of Mines and Copperbelt University (CBU), School of Mines and Mineral Sciences to develop safe and efficient methods of mining that suit the gold deposits found in Zambia.

(ix) The government needs to strengthen the monitoring process of ASGM operations to deter children from engaging in mining.

(x) The government should promote capacity building of the cooperatives by engaging the UNZA, School of Mines and CBU, School of Mines and Mineral Sciences to provide training and education to the cooperatives on efficient and environmentally benign techniques of mining and mineral processing.

(xi) In an endeavor to strengthen the Mining License Committee (MLC) committee, it is proposed that it should include representation from the Ministry responsible for Wildlife and Tourism, Civil Society Organisations (CSOs), and traditional leadership.

Mr. Isaac Mwaipopo
Executive Director
Centre for Trade Policy & Development
# TABLE OF CONTENTS

Executive Summary........................................................................................................... i
About the Author................................................................................................................ v
Forewords.............................................................................................................................. vi
Acknowledgments............................................................................................................. viii
List of Tables....................................................................................................................... ix
List of Figures...................................................................................................................... ix
Acronyms.............................................................................................................................. x

1. **Introduction** .................................................................................................................. 1
   1.1 Preamble......................................................................................................................... 1
   1.2 Research objectives....................................................................................................... 2
   1.3 Organisation of the research report............................................................................. 3

2. **Brief International Overview of Artisanal and Small-scale Mining** ......................... 4

3. **Research Methodology** .............................................................................................. 5
   3.1 Description of study areas........................................................................................... 5
   3.2 Data collection techniques.......................................................................................... 5
   3.3 Data analysis techniques............................................................................................. 6

4. **Data Collected from study areas** .............................................................................. 7

5. **Legislative and Fiscal Overview of ASGM in Zambia** .............................................. 8
   5.1 Legislative Overview of the ASGM sector in Zambia................................................... 8
   5.2 Overview of awarding of mining and non-mining rights in Zambia............................ 8
   5.3 Fiscal overview of the ASGM sector in Zambia........................................................... 9

   6.1 Features of Zambian Geology...................................................................................... 11
   6.2 Mine Planning............................................................................................................. 11
   6.2.1 Selection of a Suitable Mining Site and Method..................................................... 11
   6.2.3 Stages of a mining project...................................................................................... 12
   6.3 Mine Exploitation....................................................................................................... 12
   6.4 Mineral Processing...................................................................................................... 15
   6.4.1 Gravity concentration techniques......................................................................... 15
   6.4.2 Gold recovery techniques...................................................................................... 20

7. **Safety, Health, Environmental, and Social Impacts of Zambia’s ASGM Sector** ........ 22
   7.1 Safety and health impacts of ASGM in study areas..................................................... 22
   7.2 Environmental impacts of the ASGM sector in study areas....................................... 24
   7.3 Social aspects of artisanal and small-scale gold mining............................................. 25
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Citation

Please cite this report as “Banda, W. (2020), Appraisal of Zambia’s artisanal and small-scale gold mining sector. A joint report by the Centre for Trade Policy and Development (CTPD) and the University of Zambia (UNZA), School of Mines. Lusaka: CTPD and UNZA.

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Forewords

(1) The Centre for Trade Policy and Development (CTPD)

I am delighted that finally we have a detailed research report that can be referred to by different actors in search of sound empirical evidence on Gold mining in Zambia. This research was inspired by a great need to promote evidence-based policy formulation and debate. For a long time, stories kept being shared about the existence of precious minerals like Gold in Zambia and how it was being exploited without the knowledge of relevant authorities, several places kept being mentioned as areas where the mineral resource was found. A cursory search for information about the existence of the Gold showed that there was limited literature around the subject matter.

This triggered interest from the Centre for Trade Policy and Development in Partnership with the University of Zambia, School of Mines to undertake an in-depth analysis and document any existing evidence about this precious mineral. I actually took personal interest and accompanied the lead researcher to Rufuns and Mwinilunga as he collected data from various stakeholders, the idea was to have a hands-on experience, hear the stories for myself and see it through the eyes of the community where these resources are extracted. I am glad that finally we have gotten the end of the process and now have a detailed account, it is my sincere hope that you will all find the information we have packaged helpful, I do hope that this will become a reference point for subsequent studies that may be undertaken.

To the policy makers, this report contains insightful findings and recommendations that can help shape the policy direction on the exploitation of Gold. We are grateful that you contributed through interviews and reviewing the report when it was in its draft form.

Mr. Isaac Mwaipopo
Executive Director, CTPD
(2) The University of Zambia (UNZA), School of Mines

CTPD and UNZA, School of Mines were motivated to undertake this study because of the current gap in literature surrounding the artisanal and small-scale gold mining sector. The study focused on assessing the legal, financial, operational, technical, social, safety, environmental and health issues in three study areas, namely, Mwinilunga, Rufunsa, and Lusangazi. Based on the uncovered challenges in these areas, the study proposes a national gold mining strategy that can help GRZ promote social-economic development in communities hosting gold reserves.

To the policy makers this report constitutes sound empirical evidence to guide the process of policy formulation. To the academics this study presents an avenue for further research to inform policy formulation in the future. To the general public, this research piece dispenses critical information on gold mining in Zambia to inform the debate process. This is not a comprehensive package of Gold mining issues in Zambia but it surely sets a robust platform for further studies.

Dr. Bunda Besa
Dean, School of Mines
Acknowledgement

The Centre for Trade Policy and Development (CTPD) and the University of Zambia (UNZA), School of Mines would like to extend sincere gratitude to Diakonia for funding this study without whose support this report could not have been actualised. CTPD and UNZA further extend their appreciation to various institutions that played a key role in shaping the outcomes of this study, key among these include Ministry of Mines and Minerals Development (MMMD), Ministry of Commerce Trade and Industry (MCTI), Zambia Extractive Industry Transparency Initiative (ZEITI), Action Aid Zambia, and Department of National Parks and Wildlife.

CTPD and UNZA, School of Mines explicitly thank Mr. Isaiah Mbewe, Ms. Inonge Mutale and Mr. Edmond Kangamungazi for the immense effort expended in the data collection process. Special thanks also go to the reviewers for their constructive comments and suggestions. Lastly, but not the least sincere gratitude is extended to the CTPD media team for ensuring that a final version of this report is actualised.
List of Tables

Table 1 Data collected from study areas.................................................................7
Table 2 Features of the Gold Mining Fiscal Regime.............................................10
Table 3 General mining methods applied to small-scale mining.......................13
Table 4 Artisanal Mining methods used to extract gold........................................13
Table 5 Summary of safety and health issues of ASGM in study areas.............24
Table 6 Summary of environmental impacts of ASGM in study areas.............25
Table 7 Summary of social impacts of ASGM in study areas............................26
Table 8 Challenges faced by the ASGM sector.....................................................30

List of Figures

Figure 1 Distribution of selected minerals in Zambia..........................................1
Figure 2 Gold production in Zambia..................................................................2
Figure 3 Research methods used to realize objectives.......................................6
Figure 4 Current practice of awarding mining and non-mining rights...............9
Figure 5 Proposed Surface Mining Method layout for ASM operation..............14
Figure 6 Gold pan used by artisanal miners in Rufunsa district.......................16
Figure 7 Sluicing employed by Miners in Kanseseli area in Mwinilunga District...17
Figure 8 Sluicing using rubber mats in (a) Lusangazi and (b) Rufunsa district.....17
Figure 9 Shaker table.........................................................................................18
Figure 10 Spiral concentrator.............................................................................18
Figure 11 Simple vortex concentrator.................................................................19
Figure 12 HY-G concentrator.............................................................................19
Figure 13 Flow chart of how mercury is used to recover gold.............................20
Figure 14 Miner in Rufunsa entering an unsupported excavation.......................22
Figure 15 Burning of Amalgam on a metal plate in Lusangazi district................23
Figure 16 Child miner undertaking mining activities in Rufunsa district, Zambia..24
Figure 17 Land degradation in (a) Rufunsa and (b) Mwinilunga.........................25
Figure 18 Local business set up in Lusangazi district due to ASGM....................27
Figure 19 ASGM operators washing gold in Lusangazi district.........................27
Figure 20 Proposed Zambia’s ASGM strategy....................................................34
Figure 21 Proposed cooperative governance structure.........................................38
Figure 22 Proposed cooperative financing structure...........................................39
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASGM</td>
<td>Artisanal and Small-scale Gold Mining</td>
</tr>
<tr>
<td>ASM</td>
<td>Artisanal and Small-scale Mining</td>
</tr>
<tr>
<td>BoZ</td>
<td>Bank of Zambia</td>
</tr>
<tr>
<td>CBU</td>
<td>Copperbelt University</td>
</tr>
<tr>
<td>CIT</td>
<td>Corporate Income Tax</td>
</tr>
<tr>
<td>CTPD</td>
<td>Centre for Trade Policy and Development</td>
</tr>
<tr>
<td>CGC</td>
<td>Consolidated Gold Company</td>
</tr>
<tr>
<td>CSOs</td>
<td>Civil Society Organisations</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GSD</td>
<td>Geological Survey Department</td>
</tr>
<tr>
<td>IGF</td>
<td>Intergovernmental Forum on Mining,</td>
</tr>
<tr>
<td>MSD</td>
<td>Minerals and Sustainable development</td>
</tr>
<tr>
<td>LSGM</td>
<td>Large Scale Mining</td>
</tr>
<tr>
<td>MCTI</td>
<td>Ministry of Commerce, Trade and Industry</td>
</tr>
<tr>
<td>MMMD</td>
<td>Ministry of Mines and Minerals Development</td>
</tr>
<tr>
<td>MMSD</td>
<td>Mining, Minerals and Sustainable Development</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
<tr>
<td>RSS</td>
<td>Rock Substance Strength</td>
</tr>
<tr>
<td>UCS</td>
<td>Uniaxial Compressive Strength</td>
</tr>
<tr>
<td>UNZA</td>
<td>University of Zambia</td>
</tr>
<tr>
<td>USD</td>
<td>United States Dollar</td>
</tr>
<tr>
<td>VAT</td>
<td>Value Added Tax</td>
</tr>
<tr>
<td>ZCCM-IH</td>
<td>Zambia Consolidated Copper Mining Investment Holding</td>
</tr>
</tbody>
</table>
1. Introduction

1.1 Preamble

For many years now, the mining sector has been the mainstay of Zambia’s economy accounting for 12% of Gross Domestic Product (GDP) and over 70% of export earnings (Stephens, 2018). The sector also contributes significantly to employment and domestic revenue generation. Despite these mammoth contributions, the mining sector has been faced with several challenges including lack of geological information, infant and underdeveloped artisanal and small-scale mining sector, inconsistency in fiscal policy, and inefficient mineral revenue management. Despite these challenges, Zambia is richly endowed with a vast amount of mineral resources within its geographical confines. Although this is so, the mining sector has been dominated by copper extraction which has dwarfed the exploitation of other mineral resources such as gold, gemstone, and industrial minerals (Banda, 2016). Figure 1 shows the distribution of selected minerals across Zambia’s landscape.

![Figure 1 Distribution of selected minerals in Zambia (Siwale and Siwale, 2017)]
Most recently there has been an increasing conversation on the exploitation of gold in various parts of the country with the most recent one being the “gold rush” experienced in Mwinilunga District of North-Western province. Gold has not been fully exploited even though it possesses the potential of contributing substantially to the social-economic development of Zambia. Figure 2 shows gold production in Zambia from 2008 to 2019. It must be mentioned that a larger part of this production emanates from large scale mines.

![Gold Production in Zambia (2008 – 2017)](image)

Government has identified Artisanal and Small-scale Gold Mining (ASGM) as a potential means of maximizing the benefit of the Zambian people from the extractives sector. However, the various technical, financial, legal, operational, safety, health, and environmental dynamics surrounding this sub mineral sector are not known. Therefore, this study aims at shedding light on ASGM in Zambia. This study will potentially serve as a conduit for disseminating information on ASGM to the public. This in itself will raise public awareness and will potentially act as an important advocacy tool for influencing positive policy change in the sector.

### 1.2 Research objectives

The main objective of the study was to undertake an appraisal of Zambia’s ASGM sector. It focuses on the following sub-objectives:

(i) To review the current legislation and fiscal policy governing the ASGM sector;
(ii) To review technical issues of the ASGM sector in respective study areas;
(iii) To assess the safety, health, environmental, and social impacts of the ASGM sector in respective study areas;
(iv) To assess technical, financial, and operational challenges facing the ASGM sector in respective study areas; and
(v) To develop and recommend an ASGM strategy for Zambia.
1.3 Organisation of the research report

This report is organized as follows. The first part elaborates the background of the study and its objectives. The second part gives a brief international overview of the Artisanal and Small-scale Mining (ASM) sector. The third section explicates the research methodology that has been employed to realize the objectives. The fourth section elaborates the data collected in the study areas. The two proceeding sections deal with reviews of the legal, fiscal, and technical issues in Zambia’s ASGM sector. The seventh section assesses the safety, health, environmental, and social impacts of ASGM in the research areas. The eighth section assesses the challenges of the ASGM sector in the study areas. The ninth section proposes an ASGM strategy that the Government of the Republic of Zambia (GRZ) can adopt to transform the sector into an important tool of social-economic development. The penultimate section discusses the results of the study. The last section gives a conclusion to the study and makes relevant policy recommendations to the government.
2. Brief International Overview of Artisanal and Small-Scale Mining

ASM has experienced mammoth growth in recent years due to increasing mineral commodity prices coupled with the flows of transactional capital and migratory low-cost workforce. An estimated 40 million people were working in the ASM sector in 2017, up from 30 million in 2014, 13 million in 1999 and 6 million in 1993 (Intergovernmental Forum on Mining, Minerals and Sustainable development (IGF), 2017). ASM involves sophisticated interaction of economic, social and technological factors that can vary considerably across local and national contexts (World Health Organisation (WHO), 2016). This complexity makes it difficult to have a uniform definition. Zvarivadza (2018) identifies that there is no clear cut internationally accepted definition. D'Souza (2005) recognizes that country-specific definitions do exist that reflect locally relevant situations and developments. Many scholars have provided myriad definitions of ASM. These definitions have been centred on several attributes including production volume, capital intensity, the quantity of reserves, labour productivity, number of mine workers, and operational reliability and continuity. Mining, Minerals and Sustainable Development (MMSD) (2002) expounds ASM as an activity that exploits marginal deposits, lacks capital, is labour intensive, has poor access to readily available markets, and has low standards of health and safety. Similarly, Zvarivadza (2018) defines ASM as the exploitation of marginal ore deposits which are not profitable to mine using large scale operations through both formal and informal means using rudimentary tools. Zambia’s Mines and Minerals Development (MMD) Act No.11 of 2015 does not have a formal definition of ASM but defines it based on the area of land on which mining is undertaken using cadastre units (see Section 5).

In literature, the words informal and illegal ASM are used interchangeably. Informal ASM activities refer to those not operating in accordance and in conformity with the laws, regulations, policies and management practices of the sector. On the other hand, illegal ASM activities denote operations that do not have the requisite licences and permits required by law.

The ASM sector is closely linked with unsafe working and living conditions, high social and environmental costs, poor health and safety records, child labour, deforestation, illicit social vices and pollution (Hilson 2010; Elmes et al., 2014; Zvarivadza, 2018). These problems have stimulated criticism of ASM as a threat to the environment, local communities and vulnerable societies in general (Salo et al., 2016). Although being so, the ASM sector continues to be seen as a source of employment and hope for those who cannot get jobs in the formal sector. ASM has been claimed to possess the potential of generating socially inclusive economic growth, contributing to poverty alleviation, rural development and diversification of government revenue (Schure et al., 2011; Hilson and Osei, 2014; Labonne, 2014).
3. Research Methodology

3.1 Description of study areas

There are 21 districts in Zambia that are believed to host gold resources. This study was carried out in three of these districts, namely, Lusangazi, Mwinilunga, and Rufunsa. These districts were selected because of the high concentration of gold mining activities in the recent past.

3.2 Data collection techniques

In this study, three qualitative methods of data collection were used, namely, Focus Group Discussions (FGDs), key informant interviews, and field observations.

(a) Key Informant interviews and field observations

Ten key informant interviews were conducted with artisanal and small-scale miners to uncover the critical information with regards to the social, technical, and financial challenges they are facing. Informants from several institutions were also interviewed to uncover the current state of affairs in the ASGM sector. Respondents interviewed are those from the University of Zambia (UNZA), Copperbelt University (CBU), Ministry of Mines and Minerals Development (MMMD), Ministry of Commerce Trade and Industry (MCTI), Zambia Consolidated Copper Mines Investment Holdings (ZCCM-IH), Action Aid Zambia, Zambia Extractive Industry Initiative (ZEITI), and Bank of Zambia (BoZ). Other stakeholders that were interviewed include traditional leadership, council chairpersons, and district commissioners. Lastly, some data was obtained through field observations. This mainly helped to understand the mining technology employed by the miners.

(b) Focus Group Discussions (FGDs)

Five FGDs were conducted with purposively selected miners. Two in Rufunsfa, two in Lusangazi and one in Mwinilunga. Each of the five groups comprised 5-8 discussants that were selected from among those who participated in the semi-structured interviews and had demonstrated very good knowledge of mining. The groups consisted of men aged 20 to 40. Figure 3 shows research objectives and the corresponding methodology used to realise them.
3.3 Data analysis techniques

(a) Pairwise comparison matrix

The pairwise comparison matrix was used to assess the technical, financial, and operational challenges facing the ASGM sector. The matrix utilised the information from interviews conducted with the miners in the study areas to generate pairwise comparison scores of the challenges. The scores helped in ranking the challenges from the highest to the lowest. This was done to prioritise those meriting the greatest attention.

(b) Theory of constraint

The theory of constraint is a technique that helps in identifying the factor that prevents a system from achieving its intended goal and then systematically improving the factor so that it is no longer a limiting constraint. The theory of constraint was used in improving the proposed artisanal and small-scale gold mining strategy by identifying and eliminating identified constraints.
4. Data Collected from study areas

Table 1 presents the data that was collected from the three study areas, namely, Mwinilunga, Lusangazi, and Rufunsa districts.

<table>
<thead>
<tr>
<th>Data</th>
<th>Study Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visited Mining areas</td>
<td>Mwinilunga</td>
</tr>
<tr>
<td></td>
<td>Kaneseli area of Chief Chibwika</td>
</tr>
<tr>
<td>Mining companies operating in mining areas</td>
<td>Lusangazi</td>
</tr>
<tr>
<td></td>
<td>Sasali area</td>
</tr>
<tr>
<td></td>
<td>Rufunsa</td>
</tr>
<tr>
<td></td>
<td>Chipekele, Kanyampala, Kaombo and Shikabela areas</td>
</tr>
<tr>
<td>Mining companies undertaking Corporate Social Responsibility (CSR)</td>
<td>No mining company</td>
</tr>
<tr>
<td>Minerals found in mining areas</td>
<td>Copper, Gold, Cobalt, Nickel, Quartz</td>
</tr>
<tr>
<td>Price of gold</td>
<td>K450/gram</td>
</tr>
<tr>
<td>Price of gold</td>
<td>K500 to K530/gram</td>
</tr>
<tr>
<td>Price of gold</td>
<td>K400 to K430/gram</td>
</tr>
<tr>
<td>Gold market centre</td>
<td>Kanseseli Market</td>
</tr>
<tr>
<td>Target buyers of gold</td>
<td>Sasali Market</td>
</tr>
<tr>
<td></td>
<td>Four roads</td>
</tr>
<tr>
<td></td>
<td>Locals and foreign nationals (Tanzanians and Congolese)</td>
</tr>
<tr>
<td></td>
<td>Locals (Mostly outside Eastern Province)</td>
</tr>
<tr>
<td></td>
<td>Locals and foreign nationals (mostly Tanzanians)</td>
</tr>
<tr>
<td>Price determination of gold</td>
<td>Negotiable based on the market price</td>
</tr>
<tr>
<td>Price determination of gold</td>
<td>Based on the foreign exchange rate (higher price is charged when kwacha depreciates)</td>
</tr>
<tr>
<td>Price determination of gold</td>
<td>Higher quantity fetches a higher price per gram</td>
</tr>
<tr>
<td>Mining cooperative operating in the area</td>
<td>No mining cooperative</td>
</tr>
<tr>
<td>Mining cooperative operating in the area</td>
<td>Sasali, Jungle lion and Ma lemon (each having over 100 members).</td>
</tr>
<tr>
<td>Technology employed</td>
<td>Rudimentary approach</td>
</tr>
<tr>
<td>Technology employed</td>
<td>Rudimentary approach and a bit of mechanisation</td>
</tr>
<tr>
<td>People involved in mining</td>
<td>Rudimentary approach</td>
</tr>
<tr>
<td>People involved in mining</td>
<td>Chomwetu (26 members), Pokelo (62 members), Chitimbi, Karmwatu (27 members)</td>
</tr>
<tr>
<td>People involved in mining</td>
<td>Men and Children</td>
</tr>
<tr>
<td>People involved in mining</td>
<td>Men, Women, and Children</td>
</tr>
<tr>
<td>People involved in mining</td>
<td>Men, Women, and Children</td>
</tr>
<tr>
<td>Level of organisation</td>
<td>Mildly informal in the visited areas</td>
</tr>
<tr>
<td>Level of organisation</td>
<td>Mildly organised in the visited areas</td>
</tr>
<tr>
<td>Level of organisation</td>
<td>Highly informal in the visited areas</td>
</tr>
</tbody>
</table>
5. Legislative and Fiscal Overview of ASGM in Zambia

5.1 Legislative Overview of the ASGM sector in Zambia

The Ministry of Mines and Minerals Development (MMMD) administers the overall extractive sector in Zambia and is responsible for the development and management of mineral resources in a sustainable manner for the benefit of the people of Zambia. The MMMD portfolio functions are outlined in the Government Gazette Notice number 183 of 2012. Large Scale Gold Mining (LSGM) and ASGM operations are primarily governed by the Mines and Minerals Development (MMD) Act No. 11 of 2015. The Act provides for the appointment of four Directors by the Public Service Commission, namely, Director of Mines, Director of Geological Survey, Director of Mines Safety, and the Director of Mining Cadastre. These four Directors are responsible for the administration of the sector and provide technical advice to the Minister of MMMD. They provide technical assistance over several issues regarding geological exploration, issuing of mining and non-mining rights, environmental, health, and safety protocols.

5.2 Overview of awarding of mining and non-mining rights in Zambia

According to the MMD Act No. 11 of 2015, mining rights are defined to be exploration and mining licenses. Non-mining rights, on the other hand, are defined as the mineral processing license, gold panning certificate, minerals trading permit, mineral export permit, and mineral import permit. The MMD Act No. 11 of 2015 stipulates that the awarding of gold panning certificates, mineral import permits, minerals trading permits, and mineral export permits shall be done through the Director of Mines at the Minerals Development Department. The Mining Licence Committee (MLC) on the other hand awards exploration licences, mining licences, and mineral processing licences. The MLC comprises all representatives as stipulated in Section 6(2) (a – f) of the MMD Act No. 11 of 2015. It is important to note that it does not include representation from the Ministry responsible for Wildlife and Tourism. This creates bureaucracy in that when mining licenses are issued, the license holders need to get clearance from the Department of National Parks and Wildlife (DNPW) before they can commence mining. The clearance is to ensure and certify that the mining license is not in a Game Management Area (GMA). Secondly, the MLC which is provided for in Section 6 of the MMD Act no.11 of 2015, is dominated by civil servants in which 10 out of 11 are all appointed by the Minister. This locks out other non-government players in a key decision-making function of the sector such as Civil Society Organisations (CSOs), traditional leaders (community leaders), and to some extent even academic and research institutions. Figure 4 shows the process of obtaining mining and non-mining rights in Zambia.
According to the MMD Act No.11 of 2015, artisanal and small-scale mining licenses are defined based on cadastre units of the area of land on which an application is lodged:

(i) Artisanal Mining – a minimum of one cadastre unit and not exceeding two cadastre units; and

(ii) Small-scale mining – a minimum of three cadastre units and not exceeding one hundred and twenty cadastre units.

5.3 Fiscal overview of the ASGM sector in Zambia

At present, Zambia’s mining fiscal regime is primarily governed by the Mines and Minerals Development (Amendment of the 2015 Act) Act No. 18 of 2018, The Public Finance Management Act, 2018, the Value Added Tax Act (Chapter 331 of the Laws of Zambia), The Property Transfer Tax Act and the Income Tax Act (Chapter 323 of the laws of Zambia). Table 2 shows a description of the main taxes currently applied to the Zambian gold mining sector. It is worth mentioning that Zambia’s current tax policy does not differentiate between LSGM and ASM operators.
### Table 2 Features of the Gold Mining Fiscal Regime

<table>
<thead>
<tr>
<th>MINING TAX INSTRUMENT</th>
<th>TAX RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIT (Mineral processing and tolling)</td>
<td>35%</td>
</tr>
<tr>
<td>CIT (Mining operations)</td>
<td>30%</td>
</tr>
<tr>
<td>CIT (Mining operations engaged in beneficiation)</td>
<td>15%</td>
</tr>
<tr>
<td>Mineral royalty</td>
<td>5% of the norm value</td>
</tr>
<tr>
<td>Export duty</td>
<td>15% on precious metals</td>
</tr>
<tr>
<td>Value Added Tax (VAT)</td>
<td>Exports are zero-rated (16% paid on input purchases)</td>
</tr>
</tbody>
</table>
6.1 Features of Zambian Geology

Zambia is richly endowed with diverse minerals. This endowment is entirely a function of the variety of geological terrains and the multiplicity of thermal and tectonic events. Since the early 1930s, mining in Zambia has been predominantly focused on copper mining. However, since that time a wide spectrum of other metalliferous and non-metalliferous resources have been discovered. Although exploitation of these has been limited, they demonstrate considerable opportunities for further exploration and mining. The heavy reliance on copper mining has somewhat dwarfed the exploitation of other minerals such as gold, nickel, and Zinc (Banda, 2016). Zambia has a history of gold mining on a relatively small-scale, with twenty larger deposits having produced slightly more than 2 metric tonnes of gold since modern mining began in 1902. More than 300 gold occurrences have been reported throughout the country and some of these are currently being re-evaluated (Mining in Zambia, 2020). The other important metal production has been zinc and lead from the carbonate-hosted deposits of Kabwe which, with a total of 11 million tonnes of ore containing 40% combined zinc and lead, ranks as one of the highest grade Zn-Pb deposits of probable Mississippi Valley-type in the world (Mining in Zambia, 2020). Similar styles of mineralization have been recognized over a wide area to the north of Kabwe (Mining in Zambia, 2020).

6.2 Mine Planning

6.2.1 Selection of a Suitable Mining Site and Method

Several criteria govern the selection of a mining site and method for ASGM operations. The success of a selection process is dependent on robust mine planning and design (Banda, 2020). Some of the factors that are considered in the mine planning and design process include:

(i) Natural and geological factors (grade distribution; dip, depth, shape, the width of the deposit; the type of ore; topography of the area, ore types; hydrological conditions; climate and environmental variables of the site)

(ii) Geotechnical characteristics of the deposit and waste rock (Uniaxial Compressive Strength (UCS), Tensile Strength, Young’s Modulus, Rock Substance Strength (RSS))

(iii) Operational factors (manpower, equipment selection, accessibility to the mine site, ore grade, ore tonnage, stripping ratio, cut-off grade, production rate, access to water and electricity grid)

(iv) Social, political, and environmental factors (demographics and occupational skills of the local population, political situation, security level of the local area, and environmental legislation)

(v) Capacity requirement (manpower and equipment)
(vi) Economic factors (operating cost, investment cost, desired profit margin, and market conditions); and

(vii) Technological factors (equipment, pit slope, bench height, road grade, property lines, transportation options, and pit limits).

6.2.3 Stages of a mining project

Mining involves five main stages, namely, prospecting, exploration, mine development, mine exploitation, and mine reclamation.

(i) Prospecting – This involves undertaking preliminary work to establish the occurrence of a mineral deposit.

(ii) Exploration – This involves determining the value and extent of the orebody.

(iii) Mine Development – This stage involves the construction of surface and sub-surface infrastructure in readiness for full-blown production. It encompasses all the work required to bring the mine to full scheduled production.

(iv) Mine exploitation – This is the actual production phase of the mining project. It involves the extraction of ore blocks to achieve the desired production target.

(v) Reclamation – To safeguard both human and environmental interests, adequate plans for mine closure should be devised before mining an ore deposit, be it surface or underground. Mine reclamation, therefore, involves transforming the mine site to its initial natural state.

A wide range of technical issues within the ASGM sector in Zambia gravitate around mine exploitation and mineral processing. Therefore, this report covers these aspects in detail.

6.3 Mine Exploitation

Mine exploitation involves the extraction of the orebody from its natural habitat using suitable mining methods. The methods used in the extraction process are broadly defined under two categories, namely, surface and underground mining. Surface mining methods are generally applied when the deposit lies close to the surface. Underground mining, on the other hand, is applied when the deposit lies deep underground. Underground mining methods include unsupported, supported, and caving excavation techniques. Table 3 shows the mining methods that are generally applied under artisanal and small-scale mining. Table 4, on the other hand, shows the most common mining methods used for artisanal and small-scale gold mining operations.
### Table 3 General mining methods applied to small-scale mining

<table>
<thead>
<tr>
<th>Category</th>
<th>Class</th>
<th>Sub-class</th>
<th>Method</th>
<th>Commodity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface</td>
<td>Mechanical</td>
<td></td>
<td>• Open-pit mining</td>
<td>• Metallic</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Quarrying</td>
<td>• Non-metallic</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Open Cast (strip) mining</td>
<td>• Coal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Auger mining</td>
<td></td>
</tr>
<tr>
<td>Underground</td>
<td>Aqueous</td>
<td>• Placer Solution</td>
<td>• Hydraulicking</td>
<td>• Metallic, Non-Metallic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Borehole mining</td>
<td>• Dredging</td>
<td>• Metallic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Insitu leaching</td>
<td>• Non-Metallic</td>
<td>• Non-Metallic</td>
</tr>
<tr>
<td></td>
<td>Unsupported</td>
<td></td>
<td>• Room and pillar mining</td>
<td>• Metallic, Non-Metallic</td>
</tr>
</tbody>
</table>

### Table 4 Artisanal Mining methods used to extract gold (Salati, 2015)

<table>
<thead>
<tr>
<th>Type of deposit</th>
<th>Mining Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alluvial / Elluvial / Colluvial</td>
<td>Strip mining</td>
</tr>
<tr>
<td>Weathered Gold Lodes, Phyllitic, Quartzitic and Lateritic Materials</td>
<td>Terrace mining</td>
</tr>
<tr>
<td>Auriferous Lodes and Quartz with Depth ≤15 m</td>
<td>Shallow open pit mining</td>
</tr>
<tr>
<td>Auriferous Lodes and Quartz Vein Deposits in Hilly Terrains or Flat Plains with Depth &gt; 15 m and &lt; 50 m</td>
<td>Underground mining</td>
</tr>
</tbody>
</table>
The mining methods applied in the Zambian ASGM sector mainly consist of surface mining methods e.g. strip, terrace, and shallow open-pit mining. These methods are employed to exploit typical alluvial, colluvial, and elluvial gold deposits. Salati (2015) proposes that responsible surface mining in ASM operations can be undertaken using the layout shown in Figure 5.

![Figure 5 Proposed Surface Mining Method layout for ASM operation (Salati, 2015)](image)

The concession in Figure 5 is initially divided into panels. The overburden of the first panel is removed and dumped in an overburden stockpile area. The mineral-bearing gravel is then transported to the washing plant area where it is processed and the waste returned to backfill panel 1. As panel 1 is being mined out the topsoil and vegetation are removed from panels 2 and 3, respectively. This is done in readiness for mining.
6.4 Mineral Processing

6.4.1 Gravity concentration techniques

Concentration techniques separate the mineral of interest from the gangue mineral by exploiting differences in their physical properties. Some of these properties include surface energy, specific gravity, optical properties, and magnetic susceptibility. In more explicit terms, gravity concentration separates the mineral of interest from the gangue minerals using differences in specific gravity. Separation is brought about by the relative movement of particles and fluid resistance forces. Before concentration can be initiated the mineral ore has to undergo comminution (i.e., crushing and grinding) to liberate the mineral particles. Concentration is most effective if the grain size of the milled ore is the same. Appropriate grain size is achieved through sieving or screening. Most artisanal miners do not subject their ground ore to screening. This leads to poor recoveries.

There are several gravity concentration techniques in use today including sluice boards, jigging, gold panning, shaking tables, vortex concentrators, spiral concentrators, and centrifuges.

(a) Techniques applied in the Zambian Gold Mining Sector

The following are some of the gravity concentration methods that are commonly applied in the Zambian ASGM sector particularly the study areas.

(i) Gold panning

This technique employs a medium-sized pan to separate heavy gold particles from lighter particles. Sediments of ore thought to contain gold are placed in a wide, curved pan along with water. The miner uses a series of motions to expel the lighter particles from the heavy gold particles. After a series of successful iterations have been completed, gold will collect at the bottom of the pan for the miner to recover. The major drawback of this method is that it requires time and skill for it to be effectively applied. Another limitation is that the miner must pan a small amount of concentrate. Due to this limitation, panning is usually employed as a secondary gravity concentration technique after other methods have been applied. However, it must be mentioned that panning presents a low-cost gravity concentration method for the miner. Figure 6 shows the type of gold pans used by illegal gold miners in Rufunsa district, Zambia. When one miner was asked about the efficiency of the gold panning dishes, he responded by saying “The gold pans require some skill set to be used. Due to this state of affairs, they result in poor gold recoveries.” The other miner interviewed further explained that they recover a maximum of 1 gram of gold per day using these pans.
(ii) Sluicing

This technique involves passing water over gravel/sediments down a series of angled platforms. As the water washes the sediments down a sluice the heavy gold particles are trapped by the carpets. Constant water flow is necessary for efficient sluice operations.

Sluices are usually angled between 5 to 15 degrees. This generates greater force for the water thus sinking the gold particles on the carpet. For this reason, most gold particles are captured at the beginning of the sluice. Carpets at the bottom of the sluice are usually removed and washed in the bucket to remove the captured gold particles. A reduction in the velocity of water is essential for high gold recoveries. This can be achieved using zig-zag sluices or by connecting different angled sluices in series.

Sluicing can be used to concentrate large amounts of ore in the shortest period. However, this process does not yield a large amount of gold. This being the case, the ore that undergoes sluicing must be subjected to gold panning to increase concentration. Sluices are cheap or expensive depending on the complexity of the design. Figure 7 shows a sluice machine used by artisanal miners in Kansenseli area in Mwinilunga district. From the interviews conducted in Kansenseli, miners claim that this technique is more efficient than gold panning because it results in higher recoveries.
Figure 8 shows a form of sluicing employed by gold miners in Lusangazi and Rufunsa districts. The technique involves passing water on gravel placed on angled rubber mats.

This process utilises the water current to capture the gold particles and expel the lighter particles. The technique sometimes utilises a screen to sieve large pieces of rock as shown in Figure 8 (b).

The screen is locally known as a Gemstable. When miners were interviewed about the efficacy of this technique in relation to sluice boxes they seem to prefer the latter citing a reason of higher recoveries.

(b) Other Gravity Concentration Techniques

Other gravity concentration techniques exist that can be exploited to achieve high gold recoveries. These include shaking tables, spiral concentrators, vortex concentrators, centrifugal concentrators, and winnowing. These were not employed in the mining areas visited. However, they provide alternatives for the artisanal and small-scale miners. This section provides a brief elucidation of their operation mechanics.

(i) Shaking tables

Just like any other gravity concentration technique, the shaker table exploits differences in material density to extract the mineral of interest. The ore is fed on one side of the table containing a water feeding system. As water washes the ore down the table, the gold particles are trapped by the grooves on the table and directed to one side of the table where it collects in ports. The lighter material is then redirected to collect in waste ports. During this process, the material is agitated by the continuous shaking of the table using a motor. Shaker tables are an effective gravity concentration method yielding high recoveries. However, this technique represents quite a high capital investment for ASGM operators. Figure 9 shows an example of a shaker table.
(ii) Spiral concentrators

A spiral concentrator is a collection of angled pan dishes that rotate to trap gold particles in ridges. When gold particles are trapped in these ridges they are conveyed to the centre of the concentrator and expelled through a hole into a container. The lighter particles are then washed away the spiral concentrator into a container. After this process is repeated several times, the operator is left with a high-grade concentrate and often liberated gold. Spiral concentrators are relatively easy to operate but slightly more expensive than sluicing and panning. Figure 10 shows an example of a spiral concentrator.

(iii) Vortex concentrators

A vortex concentrator is a tub that uses a rotating flow of water to separate lighter materials from a concentrate via an elevated drain hole (see Figure 11). Its operation constitutes filling water till it reaches the collar of the drain hole. Water is then fed on the side of the tub to create a vortex motion. The created motion transports and expels lighter particles through the drain hole.
A centrifuge is simply a vessel rotating about one central point (see Figure 12). This technique exploits the difference in material density to separate the gold from gangue minerals. A slurry of pulp density of about 30-40% solids is fed into the vessel using a pipe. As the vessel rotates a centrifugal force is created pushing the material up the vessel sidewalls.

As the material is pushed up the walls the denser gold particles are trapped in the ridges while lighter particles are expelled from the vessel. Centrifuges are the most effective techniques for concentrating. However, this concentration method requires a lot of skills and is generally more expensive than other techniques.
6.4.2 Gold recovery techniques

For artisanal mineral processing in Zambia, it is assumed that the majority of the operations employ sluicing in combination with panning. Sometimes mercury is applied in conjunction with these methods to improve recoveries. Some gold panning and artisanal mining operations in Lusangazi district are using mercury in the gold panning process. This poses a serious environmental and health hazard. A mercury-free gold recovery method such as the borax technique can be used to limit health and environmental risks. Amalgamation and Borax techniques remain two commonly applied gold recovery techniques in ASGM operations. The subsequent sections provide a brief technical description of these techniques.

(i) Amalgamation

Amalgamation is the process of combining gold with mercury. This technique is widely employed by artisanal and small scale miners across the world. This is because it is a very cheap and efficient technique. Figure 13 shows a flow chart of how artisanal miners use mercury to recover gold. From the flow chart, two different paths can be observed. One path uses nitric acid to dissolve the amalgam and recover the gold. The other path uses retorting to separate the mercury from the amalgam.

![Figure 13 Flow chart of how mercury is used to recover gold](image)
(ii) Borax technique

An alternative to amalgamation is the borax technique which involves the direct melting of gold-bearing black sands. Just like the amalgamation method, this technique involves crushing and milling the gold ore. The milled ore is then subjected to sluicing, where the gold ore is run over a mat. The mats are then washed in a tub and some surfactant added to make the gold particles sink. The black sand is ground to liberate the gold particles. Borax is then added to the mixture and heated for 10-15 minutes depending on the amount of the gold. The product of this process is cleaner gold that is free of mercury. The major advantage of this technique is that it is cheap and yields over 70% more gold than the mercury technique (Appel and Na-oy, 2014). However, its drawback is that it can be a time-consuming process for beginners.
7. Safety, Health, Environmental, and Social Impacts of Zambia’s ASGM Sector

7.1 Safety and health impacts of ASGM in study areas

ASM occurs spontaneously when compared to large scale mining operations. This means that no time is dedicated to addressing health and safety concerns. Figure 14, for example, shows an ASGM operator in Rufunsia district entering into an unsupported excavation. This poses a danger to the miner because the hanging wall can potentially cave in and cause a fatality. Also, the ASGM operator does not have the proper Personal Protective Equipment (PPE) further exacerbating his safety risk.

The safety concerns in ASGM operations are somewhat linked to the rudimentary or primitive mining methods that are employed. The excavations made do not have a properly defined geometry thereby making ground reinforcement difficult. Additionally, the excavations are made in weak ground formation which can easily cave in.

![Figure 14 Miner in Rufunsia entering an unsupported excavation](image)

Health hazards in ASM operations can stem from the use of dangerous chemicals. According to WHO (2016), the most common chemical exposures in ASGM are due to:

(i) mercury used to amalgamate the gold;
(ii) cyanide used to extract gold, for example from tailings; and
(iii) Other chemicals contained in dust and gases.
The common chemical exposures in the visited mining areas (i.e., Rufunsa, Mwinilunga, and Lusangazi district) were mainly (i) and (iii). The researchers found that case (i) was only present in Lusangazi. In this mining area, amalgam is burnt on an open plate exposing the miners to dangerous fumes from mercury (see Figure 15). Mercury is a poisonous or toxic chemical which when inhaled or absorbed into the bloodstream has serious health issues. The highest concentrations of elemental mercury vapours are released when the gold amalgam is heated. According to Appel and Na-Oy (2014), burning off mercury from the amalgam imposes serious health hazards since inhaled mercury vapour passes into the blood system and causes permanent damage to the central nervous system. If inhaled by a pregnant woman, her foetus will have an increased risk of being born mentally and/or physically disabled.

![Figure 15 Burning of Amalgam on a metal plate in Lusangazi district](image)

It was also uncovered through field observations that the miners operating in Rufunsa, Mwinilunga, and Lusangazi districts are persistently exposed to dust during mining and mineral processing activities. Chemicals contained in dust pose a serious threat to the miners. Silica is a mineral found in varying concentrations in ore of the type often mined in the ASGM process. Due to their small diameter and crystalline shape, silica dust particles generated during the mining process, can be readily inhaled and deposited in the pulmonary airways (WHO, 2016). Silica dust is toxic to lung tissue and the immune system, causing progressive scarring and increased susceptibility to infectious agents, in particular, tuberculosis (Rees & Murray, 2007; Gottesfeld, Andrew & Dalhoff, 2015).
In Rufunsa, it was also uncovered that ASGM miners undertake jobs that physically strain their bodies. For example, Figure 16 shows a child miner in Rufunsa district whose back is physically strained because of using a pick and carrying heavy loads. When this child miner was interviewed he stressed that he persistently experiences back pains after mining. It can be deduced that physically straining activities expose miners to biomechanical hazards. These activities include heavy workloads, repetitive tasks, long working hours, and unsafe equipment. These hazards can lead to the development of musculoskeletal disorders, the most common of which are shoulder disorders, fatigue, and lower back pain (McPhee, 2004). Physical hazards form a broad category that includes vibration, loud noise, heat and humidity, and radiation, all of which are present in ASGM. Table 5 summarises the safety and health impacts of ASGM in Mwinilunga, Rufunsa, and Lusangazi. A tick mark symbol represents the presence of the safety and social impact in the study area whilst the cross mark represents an absence.

![Figure 16 Child miner undertaking mining activities in Rufunsa district, Zambia](image)

### Table 5 Summary of safety and health issues of ASGM in study areas

<table>
<thead>
<tr>
<th>Safety and Health Impact</th>
<th>Mwinilunga</th>
<th>Lusangazi</th>
<th>Rufunsa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid spread of diseases</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Lack of PPE</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Unsafe working tools</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Burning of amalgam in open space</td>
<td>X</td>
<td>✔</td>
<td>X</td>
</tr>
<tr>
<td>Inadequate ground reinforcement</td>
<td>X</td>
<td>X</td>
<td>✔</td>
</tr>
<tr>
<td>Exposure to dust</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Biomechanical hazard (physical strain)</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

#### 7.2 Environmental impacts of the ASGM sector in study areas

The artisanal and small-scale gold mining activities in Rufunsa, Mwinilunga, and Lusangazi pose a serious environmental concern. Mining in these areas has led to the degradation of ecologically sensitive land through the destruction of forests and landscapes. ASM operations in these areas focus on near-surface deposits. This forces miners to extract them in a lateral pattern thus affecting larger areas. Land degradation in these areas leaves much to be desired and is exacerbated by the use of poor and rudimentary mining methods.
These excavation techniques do not adhere to environmental laws and regulations. Figure 17 shows land degradation in Rufunsa and Kansenseli area in Mwinilunga, respectively. There is need for artisanal and small-scale miners to employ proper mining techniques. Section 6.3 elucidates a responsible mining method that can be adopted for surface ASGM operations in the study areas. The technique employs the concept of strip mining to extract gold. Employing this excavation technique has a dual benefit of increasing environmental protection and efficiency in the mining process. Table 6 summarises the environmental impacts of ASGM in the study areas. A tick mark symbol represents the presence of the environmental impact in the study area whilst a cross mark represents an absence.

![Figure 17 Land degradation in (a) Rufunsa and (b) Mwinilunga](image)

**Table 6 Summary of environmental impacts of ASGM in study areas**

<table>
<thead>
<tr>
<th>Environmental Impact</th>
<th>Mwinilunga</th>
<th>Lusangazi</th>
<th>Rufunsa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deforestation</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Land degradation</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Destruction of biodiversity</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Siltation of rivers due to panning</td>
<td>✔</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

### 7.3 Social aspects of artisanal and small-scale gold mining

ASM operations have several social-economic effects on the host communities where mining is being undertaken. Table 7 summarises the social impacts related to ASGM operations in Mwinilunga, Rufunsa, and Lusangazi. A tick mark symbol represents the presence of the social impact in the study area whilst a cross mark represents an absence.
The overall social-economic importance of artisanal and small-scale gold mining is a weigh between the derived social-economic benefits and expended negative effects. The following sub-sections describe the benefits and drawbacks of artisanal and small-scale mining operations in the study areas.

### 7.3.1 Benefits of ASM operations

The spate of the gold rush in Zambia has come with several social-economic benefits to the artisanal and small-scale miners and surrounding communities that host the mining operations. These benefits include income generation, increased business activity, employment opportunities, and poverty eradication.

**(i) Income Generation**

The gold rush in Mwinilunga, Rufunsas, and Lusangazi has come with a direct benefit of increased income generation of the locals. Miners involved in ASM operations mine and sell gold to Zambians and foreign nationals. The revenue generated provides disposable income which is used to support the wellbeing of their families. The proceeds obtained are also used to further the education of their children. Above all the income enables the provision of basic necessities of life such as clothing and food.

**(ii) Multiplier effect and linkages to other sectors**

Artisanal and small-scale gold mining operations in Rufunsas, Lusangazi, and Mwinilunga have led to a boost in other business activities including lodges, restaurants, bars, and suppliers of handheld tools. For instance, the gold rush in Mwinilunga led to an increase in the local population thereby increasing the demand for accommodation. This led to a direct boost in the hoteling business. Also, the proceeds obtained by miners from the sale of gold increased the purchasing power of local markets. Figure 18 shows local businesses that have been set up in Lusangazi district as a result of the artisanal and small-scale gold mining operations.

---

**Table 7 Summary of social impacts of ASGM in study areas**

<table>
<thead>
<tr>
<th>Social impact</th>
<th>Mwinilunga</th>
<th>Lusangazi</th>
<th>Rufunsas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crime and gangsterism</td>
<td>✔</td>
<td>✔</td>
<td>X</td>
</tr>
<tr>
<td>Income generation</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Multiplier effect and linkages to other sectors</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Employment opportunity</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Prostitution and spread of HIV/AIDS</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Alcoholism and substance abuse</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Use of child labour</td>
<td>✔</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Gender discrimination</td>
<td>✔</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food insecurity</td>
<td>✔</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Broken families</td>
<td>✔</td>
<td>✔</td>
<td>X</td>
</tr>
</tbody>
</table>
(iii) Employment opportunity

ASM has provided employment opportunities for both men and women in the respective study areas. Figure 19 shows a woman and two men in Lusangazi district working at a gold washing plant. Although women are active, they also tend to face discrimination due to social and cultural norms. For instance, in Kanseseli area in Mwinilunga district, it was gathered through interviews that women are not allowed to participate in mining because of cultural myths.
7.3.2 Negative effects of ASM

Although gold mining has dispensed some social-economic benefits in the mining areas it is also important to note that this activity has come with several negative effects on society. Some of these effects include prostitution, crime, food insecurity, child labour, alcohol and substance abuse.

(i) Prostitution

The gold mining operations have led to an increase in prostitution and promiscuity in the study mining areas particularly Mwinilunga and Lusangazi. The potential driver of prostitution borders on the reason of poverty. Most of the visited mining areas are poor leaving people with no financial resources to support their families. When some community members were interviewed it was gathered that some women engage in prostitution to earn an easily disposable income to take care of their families.

(ii) Food insecurity

The case of food insecurity was only present in the case of Mwinilunga. Based on some residents that were interviewed, it was uncovered that the recent gold rush made some people abandon agriculture and transit to mining. The reason for this undertaking was centred on the belief that mining pays more than agriculture. However, the long-term sustainability of incomes in many rural households has not been guaranteed because switching to mining only provided temporal economic benefits that were short-lived when the Mwinilunga mining areas where put under state control. A study done by Caritas Zambia (2019) seems to confirm this.

(iii) Crime

Issues of crime were particularly present in Mwinilunga and Lusangazi. From the interview process it was informed that the initial gold rushes in Mwinilunga integrated a lot of people with different social-economic profiles. To this effect, gold mining in these areas led to a potential increase in crime and gangsterism thereby leading to serious human insecurity. In Lusangazi, some elements of gangsterism were also observed at the mine sites where group leaders suppressed and extorted monies from others through force.

(iv) Child labour

The case of child labour in ASGM operations was particularly present in all three study areas. This can be viewed as a negative or positive social issue. Positive in the sense that it provides an income to the children and parents for them to pay their school fees, buy books, meals, etc. This enables them to have an education which they cannot initially afford. Figure 16 shows a child miner in Rufunsu who undertakes illegal mining activities just to survive. The proceeds obtained from the mining activity go directly in providing the basic necessities of life such as food and clothing. A study done by Caritas Zambia (2019) shows that mining activities in Kansenseli area in Mwinilunga, contributed to the increase in absenteeism of pupils from writing their final examinations in grade seven (7) and nine (9).
At grade seven-level, the highest number of pupils absent from the 2019 final examinations in one school was forty-eight (48), which is eighteen (18) boys and thirty (30) girls. For grade nine final examinations for the year 2019, the highest number of absenteeism recorded in one sampled school was twenty-six (26), that is, twenty-three (23) boys and three (3) girls.

(v) Substance and alcohol abuse

Another social negative effect of ASGM in the study areas is increased substance and alcohol abuse leading to low human productivity and serious health concerns. One of the community members who was interviewed responded that miners sometimes engage in this substance abuse because of the disposable income provided by mining.
8. Challenges of ASGM sector in study areas

The artisanal and small-scale miners in Mwinilunga, Rufunsa, and Lusangazi face several technical, operational, and financial challenges as listed in Table 8. These challenges need to be resolved to provide an economical, safe, and efficient exploitation process of gold by artisanal and small-scale miners. To achieve this, the challenges must be ranked to prioritise those that need immediate attention. A pairwise comparison matrix was used to generate scores. This matrix was created using the information collected via interviews and FGDs undertaken with the miners with regards to the challenges faced in the three study areas. A challenge generating the highest pairwise comparison score indicates that which merits the highest attention and vice versa.

<table>
<thead>
<tr>
<th>Type of challenge</th>
<th>Challenge</th>
<th>Pairwise comparison Score</th>
<th>Rank number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical</td>
<td>Lack of geological information</td>
<td>0.73</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Lack of appropriate orebodies (disseminated orebodies)</td>
<td>0.51</td>
<td>2</td>
</tr>
<tr>
<td>Financial</td>
<td>Lack of access to finance</td>
<td>0.34</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Lack of readily available market for the mined gold</td>
<td>0.05</td>
<td>8</td>
</tr>
<tr>
<td>Operational</td>
<td>Lack of equipment</td>
<td>0.23</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Unskilled labour force</td>
<td>0.07</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Lack of manpower</td>
<td>0.10</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Use of inefficient mining methods and techniques</td>
<td>0.16</td>
<td>5</td>
</tr>
</tbody>
</table>

From Table 8, the lack of geological information generating a pairwise comparison score of 0.73 is a challenge that merits the greatest attention. As outlined in Section 6.2.3, prospecting and exploration are precursors to mining culminating in generation of geological information. This information leads to a robust decision-making process. For instance, the information can help miners choose an optimal mining technique. This will subsequently lead to sustainable exploitation of the gold resource in the study areas. Disseminated or lack of appropriate orebodies yielding a pairwise comparison score of 0.51 is second in ranking. Most of the deposits in ASGM operations at the visited sites seem to be disseminated. This possess a challenge because miners need to excavate huge amounts of waste before they can extract a unit weight of gold. This leads to high stripping ratios which can be uneconomical and would require more human effort. The third challenge having a score of 0.34 is lack of access to finance. This leads to financial incapacitation and denies the artisanal and small-scale miners to purchase and employ technology that will lead to the efficient and effective exploitation process of gold. Due to this, lack of equipment yielding a score of 0.23 ranks as a fourth challenge. Use of inefficient mining and mineral processing techniques having a score of 0.16 ranks fifth.
This challenge is a result of the first, second, third, and fourth challenges. Lack of manpower generating a score of 0.10 is sixth in ranking. This is as a result of the miners using labor-intensive technology because of lack of equipment due to financial incapacitation. Unskilled labour force yielding a score of 0.07 ranks third. This is so because miners lack training on basic technical mining issues. This greatly contributes to the fifth challenge and exacerbates safety, health, and environmental risks. Lack of a readily available market ranks last. Although access to markets was not found to be a big challenge in these mining areas it is important to note that the artisanal and small-scale miners are somewhat exploited by the traders or gold buying agents offering a very low price than that on the international market (see Table 1).
9. Development of an Artisanal and Small-scale Gold Mining Strategy

9.1 Current undertakings by GRZ in the ASGM sector

The following are some recent undertakings by GRZ in the gold mining sector.

(i) GRZ through ZCCM-IH has started preliminary exploration works in Kanseseli area of Mwinilunga;

(ii) Consolidated Gold Company (CGC) Limited has set up a state of the art testing laboratory to ascertain the quality of gold emanating from ASGM operators;

(iii) CGC Limited is helping licensed small-scale gold miners in Rufunsa mining area with technical expertise in developing their mines and providing access to earth moving machines to increase gold ore production;

(iv) ZCCM-IH has started buying gold from ASGM operators at a starting price of K550/gramme as one of the steps of formalising mining and trading activities in the ASGM sector;

(v) Some cooperatives have been formed in some gold mining areas (see Table 1);

(vi) GRZ through MMMD has started purchasing some equipment for the ASGM operators; and

(vii) ZCCM-IH has set aside USD 23 Million to start buying 40,000 Kilogrammes of gold from local sources this year.

9.1.1 Observations of the recent undertakings by GRZ in the ASGM Sector

The recent undertakings by GRZ seem to be executed unsystematically without a properly laid down procedure. For instance, the government seems to be obsessed with buying gold from the miners without putting systems and infrastructure in place to alleviate poverty levels in communities hosting gold resources. The following are some of the observations with regards to the recent government undertakings:

(i) GRZ through ZCCM-IH seems to be undertaking exploration for its sole benefit. No initiative directly gravitates in providing geological information to the artisanal and small-scale miners in communities hosting gold resources.

(ii) There is no clear deliberate policy that speaks to the financing of geological exploration through Geological Survey Department (GSD).
(iii) The government seems not to be engaging with communities on the way forward and strategy with regards to gold mining in various areas. For instance, ZCCM-IH has moved to Kaneseli area in Mwinilunga without engaging the community on the way forward on gold mining.

(iv) There is no deliberate action by GRZ that aims to train and finance the formed cooperatives or mining groups. It is important to be cognizant of the fact that formalisation cannot exist without education. This is because uneducated ASM operators even when formalised will continue to use inefficient mining and mineral processing techniques resulting in widespread land degradation, pollution, and significant health impacts.

(v) GRZ has not set up trade hubs or marketing centres to facilitate the buying of gold in remote mining areas particularly at the research sites.

(vi) Although GRZ claims to have bought equipment, miners in the study areas, namely, Rufunsa and Lusangazi have not benefited from this initiative.

(vii) The government seems to have no deliberate plan to support women in ASGM operations

To address some of the above observations, an ASGM strategy has been proposed for Zambia.

9.2 Description of the ASGM strategy

An ASGM plan has been proposed for Zambia (Figure 20). The main players in the plan include the Ministry of Commerce Trade and Industry (MCTI), Ministry of Mines and Minerals Development (MMMD), Bank of Zambia (BoZ), and Zambia Consolidated Copper Mining Investment Holding (ZCCM-IH). The following steps explicate the proposed ASGM strategy.
Figure 20 Proposed Zambia’s ASGM strategy

**Step 1 – GRZ through MMMD to obtain a social license to operate**

The first step of the ASGM plan is for GRZ through MMMD to obtain a social license to operate in communities hosting gold resources. This license should precede any exploration works to be undertaken in these communities. The process of GRZ obtaining the license should involve community engagements with various local stakeholders to uncover the government’s plan for the sector. The government should demonstrate how it intends to use gold as a strategic mineral resource for alienating poverty and inducing macroeconomic stability.

**Step 2 – GSD to undertake geological mapping and exploration**

After obtaining the social license to operate, GRZ through GSD needs to move into mining areas to undertake geological mapping and exploration. This exercise should be done to quantify gold resources both in tonnage and quality. This geological information is important because it leads to informed decision making. The government cannot begin to contemplate using gold as a strategic social-economic mineral if the reserves are not known both in tonnage and quality. Being cognizant that GSD is poorly resourced, the framework advances that 10% of monthly mineral royalty should accrue into its coffers.
Step 3 – Developing efficient gold exploitation techniques by Universities

Once the reserves are quantified both in tonnage and quality, GRZ needs to engage UNZA, School of Mines and CBU, School of Mines and Mineral Sciences to undertake Research and Development (R&D) that aims at uncovering efficient mining and mineral processing techniques that lead to the economic exploitation of gold resources. The techniques to be applied in the ASGM sector should exhibit high technical efficiency and must be environmentally benign.

Step 4 – Formation and training of mining cooperatives

The fourth stage of the plan is for host communities to form mining cooperatives. The cooperatives should integrate and organise community members into mining groups having the same social-economic interest. Once the cooperatives are formed, UNZA, School of Mines and CBU, School of Mines and Mineral Sciences can begin to offer technical and business training to these cooperatives in pursuit of building capacity. It is proposed that technical colleges offer education to mining cooperatives inform of craft training such as maintenance and operation of mine equipment.

Step 5 – Establishment of Trade Hubs by MCTI in remote mining areas

The fifth step is for MCTI to establish trade hubs in remote mining areas. These trade hubs are to facilitate the buying and selling of gold between cooperatives and ZCCM-IH in remote mining areas. The main objective of MCTI will be to facilitate the buying and selling of gold between cooperatives and ZCCM-IH.

Step 6 – Cooperatives selling gold to ZCCM-IH

The production exploited by cooperatives will be sold to ZCCM-IH through established trade hubs by MCTI. The production can also be sold to the external market at competitive prices.

Step 7 – Selling of gold to BoZ through ZCCM-IH

ZCCM-IH has set up the Zambia Gold Company Limited. The company is undertaking mining activities in communities hosting gold. It is proposed that the exploited gold production by the mining company should be sold to the BoZ to act as a strategic reserve. The production can also be sold to the external market at competitive prices.

Step 8 – MCTI to facilitate linkage of cooperatives to external market

MCTI should facilitate the linkage of cooperatives to the external market to encourage the competitive buying of gold. To be competitive in the market, ZCCM-IH needs to keep a variable price of gold tagged to the Kwacha and USD foreign exchange rate. This is because ASGM operators will choose to sell this gold to the external market when Kwacha depreciates against the USD.

9.3 The proposed management structure of cooperatives in ASGM strategy

In this section, a management structure has been proposed for cooperatives in the ASGM plan. The proposed management framework is divided into two structures, namely, governance and financing. In Zambia, cooperatives are legal entities that are registered and governed by cooperative legislation. The following are the three pieces of legislation that govern cooperative societies in Zambia.
(i) **Cooperative Societies Act No. 20 of 1998** – This is an enactment of the parliament of Zambia that addresses issues concerning the formation, registration, and regulation of cooperative societies.

(ii) **Statutory instrument No. 26 of 1999** – This an instrument that is presided over by the Minister of MCTI. It addresses or discusses the documents used in the application of membership, amendment of by-laws, registration, and deregistration of cooperatives.

(iii) **By-laws of cooperatives** – These are laws developed in a participatory manner. They set out the vision, objectives as well as rules and regulations of the internal governance of cooperatives. By-laws are crafted and approved by the general membership and should not conflict with any other law of Zambia.

### 9.3.1 Proposed governance structure of cooperatives

There is no single format for structuring cooperatives because every cooperative can be organised uniquely to address the interest of its members. The proposed structure (Figure 21) is not a single format framework but a proposal of the common features or elements that must be adopted in the governing process of mining cooperatives in the ASGM plan. The proposed structure encompasses five key organs, namely, general membership, the board of directors, management, audit committee, and the marketing committee.

(i) **General Membership**

This is the supreme decision making organ of a cooperative. It constitutes of mining workers who are also employees of the cooperative. The governance principles of the cooperative should gravitate around fulfilling and maximising the interest of the general membership. The decision making principle must be based on one member one vote. This should be irrespective of the membership contribution and shares held in the cooperative. The core idea is for all members to have equal powers in the governance of the cooperative. This setting helps to avert conflict among members. By-laws may stipulate that some decisions should be made by a board of directors which is democratically elected into office by the general membership.

(ii) **Board of Directors**

The board of directors makes critical decisions that ultimately determine the success or failure of a cooperative. The board should champion the interest of the general membership by providing an enabling environment for sustainable operation and growth. To achieve this the board needs to provide a supervisory and leadership role to management and critical committees of the cooperative. Supervision of management is cardinal in averting a situation where the core objectives of management deviate from those of the cooperative in what is known as a principal-agent problem. Depending on by-laws the board of directors can be elected annually or every after two years. Before the end of the tenure of office, the board of directors needs to create a nomination committee that will be in charge of the electoral process. The committee should converse with regular members to raise awareness of the board’s duties and the upcoming election.
(iii) Audit Committee

An audits committee should be established that oversees and audits all activities and processes of the board of directors and management. The committee should constitute at least three members of the cooperative who are democratically elected by the general membership and should include one external accountant responsible for financial audits. This committee should report the audit results to the general membership. Auditing operations of management and the board of directors is cardinal in preventing the principal-agent problem, where the objectives of the board and management deviate from those of the general membership. The auditing process helps prevent internal conflict and eventual failure of a cooperative organisation.

(iv) Marketing committee

A marketing committee should be responsible for connecting the cooperative with readily available markets. It should establish a link with the MMMD for onward linkage with the external market. It is proposed that this committee should constitute at least two democratically elected members of the general membership and the financial manager sitting under management.

(v) Management

A professional team of people should be employed by the board of directors to execute the plans of the cooperative. The hired professionals should be paid a percentage of production or salary for their service. In an ideal case, this team should constitute of senior, middle, and junior management.
9.3.2 Proposed financing structure of cooperatives

The proposed financing structure (Figure 22) does not exhaust all sources of finance but provides those that are critical. Cooperative finance can come in the form of a government grant, debt financing, and membership contribution. It is proposed that 30% to 50% of the start-up capital of the cooperatives should be given as government grant, the other 50% should come from debt financing. The finances generated from ploughed back profits must be used to service the loan incurred. A remaining portion of the finances can then be ploughed back into the cooperative. Once the debt is fully paid, the cooperative can retain 100 percent of the internal sources of finance to undertake some of the following activities:
(i) Buying more efficient technology;
(ii) Investing in member or staff training and education;
(iii) Geological services;
(iv) Improving the financial welfare of management; and
(v) Making other changes for the smooth running of the cooperative;

9.4 Mining cooperatives in other countries

The ASGM strategy advanced in the previous section gravitates towards the cooperative approach. This being so, it is important to bring out their success stories in different countries. This section explicates the case of Ivory Coast and Rwanda.

(a) Ivory Coast

Ivory Coast is one country that has exploited village mining cooperatives. These cooperatives were known as GVC and were initially applied to the diamond sector but later extended to ASM operations (RCS Global, 2016). The system was efficient in bringing order to the ASM sector (RCS Global, 2016). However, it later failed because it was replicated by a rebel group known as Forces Nouvelles (FN). However, Kouame et al. (2015) still advocate for the reintroduction of the GVC system to support and develop the artisanal and small-scale mining sector in Ivory Coast.
(b) Rwanda

Rwanda is another country that has successfully applied the cooperative approach to the ASM sector. In 1986, with assistance from a loan under the Lome II convention, a national cooperative structure was formed known as COPIMAR. Following a structural reformation to the mining sector, COPIMAR was later named FECOMIRWA in 2009. The entry of FECOMIRWA in mining has come with several benefits and has made cooperatives a worthwhile governance approach in the sector. Perks (2012) highlights several benefits of cooperatives in the Rwandan artisanal and small-scale mining sector, including:

(i) Organised mining where members actively participate in decision making;

(ii) Shared savings allowing for greater capital accumulation making it possible for miners to attend to personal or household needs;

(iii) Local development due to the proximity of mining sites to communities; and

(iv) Provision of loans, market access, and related to this, fairer pricing, and timely payments.
10. Discussion

This research study had the objective of undertaking an appraisal of Zambia’s artisanal and small-scale gold mining sector. The study was centered in three main areas, namely, Lusangazi, Mwinilunga, and Rufuns. These areas were selected because of the recent gold rushes and high concentration of artisanal and small-scale gold mining activities. The research study endeavored to uncover the technical, economic, legal, environmental, health, and safety impacts of ASGM in the three study areas. Subsequently, the study devised a strategy for Zambia’s ASGM sector.

Under the review of the legislative and fiscal policy, it was uncovered that the MLC is heavily represented by civil servants, locking out other non-governmental stakeholders in the decision function of the sector. Lastly, it was discovered through a literature survey that Zambia’s current gold mining taxation regime does not differentiate between large and small-scale mine operators. This arguably leads to the imposition of an excessive tax burden on the latter.

In reviewing the technical mining issues in the respective study areas, it was found that the miners mainly employed rudimentary mining and mineral processing techniques with little or no mechanization at some sites. Through interviews and FGDs, it was uncovered that the current technology employed including panning dishes, and gemstables result in poor mineral recoveries.

In the study areas, an assessment of the impact of ASGM operations on safety, health, environment, and social life was undertaken. It was uncovered that these areas face several impacts as summarized in Tables 5, 6, and 7. These challenges need to be resolved to promote the sustainable development of the ASGM sector. For instance, the issue of land degradation needs a prompt response by applying environmentally benign mining techniques. Additionally, miners need to undergo extensive training to limit environmental destruction. It is believed that through training, miners will begin to apply safe and efficient mining techniques.

The challenges of the ASGM sector were also assessed to prioritize those that merit greater attention. From the results, the lack of geological information, inappropriate ore bodies, and lack of access to finance were the three highest-ranked challenges in the study areas. These challenges have a direct bearing on other challenges such as lack of equipment, and the use of inefficient mining and mineral processing methods. Therefore, resolving these three challenges will indirectly resolve others (see Table 8).

Based on the highlighted challenges and the current weaknesses of GRZ’s strategy in the gold mining sector, an ASGM strategy for Zambia has been proposed. The strategy promotes the alleviation of poverty levels in gold mining communities. Additionally, the strategy promotes macroeconomic stability by using gold as a national and foreign currency reserve at BoZ.
The strategy gravitates towards organizing artisanal and small-scale miners into cooperatives. This being so the government needs to ensure that it puts systems in place that will ensure that these cooperatives will thrive. Since the ASGM strategy gravitates towards a cooperative approach. The management structure of the gold mining cooperatives has been advanced. The structure constitutes of governance and financing frameworks. The governance framework helps to eliminate power imbalances whilst the financing structure gives a framework on how cooperatives can be effectively financed to initiate self-reliance.
11. Conclusion and Recommendations

This study appraised ASGM in Zambia. The appraisal process constituted a review of legal, fiscal, financial, and technical issues around the ASGM sector. It also constituted an assessment of the social, environmental, safety, and health impacts of ASGM in respective study areas. In addressing the several issues confronting the ASGM sector, a strategy has been developed and proposed for Zambia. In going forward the study recommends the following:

(i) The government should consider increasing geological mapping and exploration in areas claimed to have gold. This process will ascertain the quality and quantity of reserves and improve decision making.

(ii) The government should consider allocating 10 percent of the proceeds from mineral royalty to the Geological Survey Department (GSD) to ensure sustained financing of prospecting and exploration activities.

(iii) The government should support the formation of cooperatives through engagement with communities hosting gold resources.

(iv) The government should actively finance ASGM cooperatives. It should seriously contemplate adding an allocation of ASGM cooperative financing in the national budget.

(v) The government through the Ministry of Commerce Trade and Industry (MCTI) should establish trade hubs or market centres in remote ASGM areas to facilitate the buying of gold by ZCCM-IH.

(vi) The government through the Ministry of Commerce Trade and Industry (MCTI) should facilitate the linkage of the cooperatives to the external market.

(vii) The government should consider designing a sector-specific fiscal regime that supports the growth of the ASGM sector.

(viii) The government should engage the University of Zambia (UNZA), School of Mines and Copperbelt University (CBU), School of Mines and Mineral Sciences to develop safe and efficient methods of mining that suit the gold deposits found in Zambia.

(ix) The government needs to strengthen the monitoring process of ASGM operations to deter children from engaging in mining.
(x) The government should promote capacity building of the cooperatives by engaging the UNZA, School of Mines and CBU, School of Mines and Mineral Sciences to provide training and education to the cooperatives on efficient and environmentally benign techniques of mining and mineral processing.

(xi) In an endeavor to strengthen the MLC committee, it is proposed that it should include representation from the Ministry responsible for Wildlife and Tourism, Civil Society Organisations (CSOs), and traditional leadership.
References


Labonne, B. (2014). Who is afraid of artisanal and small-scale mining (ASM)? The Extractive Industries and Societies, 1(2), 121-123. Retrieved from https://doi.org/10.1016/j.exis.2014.03.002


