

**THE SOCIO-ENVIRONMENTAL IMPACTS OF SMALL-SCALE MINING  
OPERATIONS IN THE TARKWA-NSUAEM MUNICIPALITY IN GHANA**

**By**

**Opoku Mensah Seth**

**THESIS**

Submitted to  
KDI School of Public Policy and Management  
In partial fulfillment of the requirements  
For the degree of

**MASTER OF DEVELOPMENT POLICY**

**2016**

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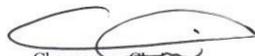
**MASTER OF DEVELOPMENT POLICY**

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## TABLE OF CONTENTS

<b>ACKNOWLEDGEMENT</b> .....	<b>i</b>
<b>LIST OF TABLES/FIGURES</b> .....	<b>vi</b>
List of Tables.....	vi
List of Figures .....	vii
<b>LIST OF ABBREVIATIONS</b> .....	<b>viii</b>
<b>ABSTRACT</b> .....	<b>ix</b>
<b>CHAPTER ONE</b> .....	<b>1</b>
<b>GENERAL INTRODUCTION</b> .....	<b>1</b>
<b>1.1 Introduction</b> .....	<b>1</b>
<b>1.2 Problem Statement</b> .....	<b>2</b>
<b>1.3 Research Questions</b> .....	<b>4</b>
<b>1.4 Justification of the Study</b> .....	<b>4</b>
<b>CHAPTER TWO</b> .....	<b>6</b>
<b>UNDERSTANDING SMALL-SCALE MINING AND ITS SOCIO ENVIRONMENTAL IMPACTS: A CONCEPTUAL OVERVIEW</b> .....	<b>6</b>
<b>2.1 Understanding Small-Scale Mining</b> .....	<b>6</b>
<b>2.2 Legal and Regulatory Framework for Small-Scale Gold Mining in Ghana</b> .....	<b>9</b>
<b>2.4 Modus Operandi of Small-Scale Gold Mining in Ghana</b> .....	<b>12</b>
2.5.1 Impacts on Livelihoods .....	16
2.5.2 Impacts on Employment and Revenue Generation .....	17
2.5.3 Impacts on Poverty Reduction .....	18
<b>2.7 Theoretical Framework</b> .....	<b>20</b>
2.7.1 The Classical Theory of Informal Sector .....	21
2.7.2 The Tragedy of the Commons.....	21
2.7.3 UNDP’s Sustainable Livelihood Framework.....	22
<b>CHAPTER THREE</b> .....	<b>26</b>
<b>BACKGROUND OF THE STUDY AREA AND RESEARCH METHODOLOGY</b> .....	<b>26</b>
<b>3.1 Introduction</b> .....	<b>26</b>
<b>3.2 Background of the Tarkwa-Nsuaem Municipality</b> .....	<b>26</b>
<b>3.3 Physical Characteristics of Tarkwa-Nsuaem Municipality</b> .....	<b>27</b>

3.3.1 Climate .....	27
3.3.2 Vegetation .....	27
3.3.3 Geology and Soil.....	27
3.3.4 Relief and Drainage.....	28
3.3.5 Demographic Characteristics .....	28
3.4.1 Mining and Quarrying .....	28
3.4.2 Tourism .....	29
3.4.3 Agricultural Activities.....	29
<b>3.5 Socio-economic Infrastructure in the Municipality .....</b>	<b>30</b>
3.5.1 Education.....	30
3.5.2 Health, Water and Sanitation .....	30
3.5.3 Roads.....	30
3.5.4 Market .....	30
<b>3.6 Research Methodology .....</b>	<b>30</b>
3.6.1 Research Design.....	31
3.6.2 Case Study Approach and Justification.....	31
3.6.3 Sources of Data .....	32
3.6.4 Sampling Techniques .....	33
3.6.5 Data Analysis .....	33
3.6.6 Ethical Consideration .....	34
<b>3.7 Research Limitations .....</b>	<b>34</b>
<b>CHAPTER FOUR.....</b>	<b>36</b>
<b>MODE OF OPERATIONS OF SMALL-SCALE GOLD MINING AND LIVELIHOOD ISSUES IN THE TARKWA-NSUAEM MUNICIPALITY .....</b>	<b>36</b>
<b>4.1 Introduction.....</b>	<b>36</b>
<b>4.2 Background of Respondents .....</b>	<b>36</b>
<b>4.3 Overview of Small-Scale Gold Mining in the Tarkwa-Nsuaem Municipality.....</b>	<b>37</b>
<b>4.4 Acquisition of Valid Mining Licence.....</b>	<b>38</b>
<b>4.6 Overview of Small-Scale Gold Mining Companies/Groups in the Municipality .....</b>	<b>39</b>
4.6.1 Dakete Company Limited .....	39
4.6.2 Nana Yefri Mining Group .....	40

4.6.3 The Akoon Group.....	41
4.6.4 The Asamankakraba Group.....	41
<b>4.7 Mode of Operations of the Small-Scale Gold Mining Companies/Groups.....</b>	<b>41</b>
<b>4.8 Gold Processing in the Tarkwa-Nsuaem Municipality.....</b>	<b>43</b>
<b>4.9 Licensed Buying Agents .....</b>	<b>45</b>
<b>4.10 Small-Scale Gold Mining and Livelihood in the Tarkwa-Nsuaem Municipality.....</b>	<b>45</b>
4.10.1 Introduction .....	45
4.10.2 Small-scale Gold Mining as Source of Quick Money .....	46
4.10.3 Small-scale Mining as Source of Employment .....	46
4.10.4 Small-scale Mining and Local Economic Development.....	47
4.10.5 Other Economic Activities Generated by Small-Scale Mining .....	48
4.10.6 Profitability of Small-scale Mining over Other Economic Activities.....	49
<b>4.11 Ensuring the Sustainability of Livelihoods in the Tarkwa-Nsuaem Municipality .....</b>	<b>50</b>
<b>CHAPTER FIVE .....</b>	<b>52</b>
<b>SMALL-SCALE GOLD MINING AND THE NATURAL ENVIRONMENT IN THE TARKWA-NSUAEM MUNICIPALITY.....</b>	<b>52</b>
<b>5.1 Introduction.....</b>	<b>52</b>
<b>5.2 Environmental Impacts of Small-Scale Gold Mining in the Municipality .....</b>	<b>52</b>
5.2.1 Small-scale Mining and Loss of Farmlands.....	53
5.2.2 Small-scale Mining and Water Bodies.....	55
5.2.3 Small-scale Mining and Uncovered Pits .....	56
5.2.4 Small-scale Mining and Health .....	57
<b>5.3 Small-scale Gold Mining and other Social-economic Impacts .....</b>	<b>57</b>
<b>5.4 Environmental Coping Strategies in the Tarkwa-Nsuaem Municipality .....</b>	<b>59</b>
5.4.1 Coping with Loss of Farmlands .....	59
5.4.2 Coping with Water Pollution .....	59
5.4.3 Coping with Uncovered Pits .....	60
5.4.4 Coping with Social-economic Impacts .....	60
<b>CHAPTER SIX .....</b>	<b>62</b>
<b>SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSIONS .....</b>	<b>62</b>
<b>6.1 Introduction.....</b>	<b>62</b>

<b>6.2 Summary of Major Findings.....</b>	<b>62</b>
<b>6.3 Recommendations .....</b>	<b>64</b>
6.3.1 Decentralising the Acquisition of Valid Mining Licence .....	64
6.3.2 Enforcing Compliance with Small-scale Mining Laws and Regulations .....	64
6.3.3 Reclaiming Land .....	65
6.3.4 Providing Financial and Legal Support.....	65
6.3.5 Ensuring Collaboration and Participation of All Stakeholders .....	66
6.3.6 Promoting the Establishment of Small and Medium Scale Enterprises.....	66
6.3.7 Providing Skills Development Programmes and Education .....	67
6.3.8 Environmental Awareness and Health Hazard Education .....	67
6.3.9 Providing Commensurable Compensation Packages .....	67
3.3.10 Formation of Small-Scale Mining Associations .....	68
<b>6.4 Conclusion .....</b>	<b>68</b>
<b>APPENDIX.....</b>	<b>70</b>
<b>REFERENCES.....</b>	<b>76</b>

## **LIST OF TABLES/FIGURES**

### List of Tables

Table 1: Institutional Framework for Small-Scale Mining in Ghana .....	11
Table 2: Short and Long Term Effects of Small-scale Mining of Livelihoods .....	16
Table 3: Environmental Impacts of Small-scale Gold Mining .....	19

## List of Figures

Figure 1: Common Issues of Small-scale mining .....	7
Figure 2: Factors Promoting Illegality in Small-Scale Gold Mining in Ghana .....	9
Figure 3: Prospective Small-scale Gold Mining Regions in Ghana.....	12
Figure 4: Prospective Small-scale Diamond Mining Regions in Ghana .....	12
Figure 5: Blanket Washing .....	15
Figure 6: Hand-washing .....	15
Figure 7: Roasting in Open Air.....	15
Figure 8: UNDP’s Approach to Promoting Sustainable Livelihoods.....	23
Figure 9: Conceptual Framework .....	24
Figure 10: The Municipality in Regional Context.....	26
Figure 11: The Municipality in Context.....	26
Figure 12: Gold Processing with Mercury in Residential Area.....	44
Figure 13: Charcoal Burning Activities in the Municipality .....	49
Figure 14: Destroyed Vegetation Cover in the Municipality.....	54
Figure 15: Siltation and Pollution of River Bediabewo in the Municipality .....	56
Figure 16: Abandoned Mine Pits with Some Covered by Vegetation in the Municipality .....	56

## LIST OF ABBREVIATIONS

AG	Asamankakraba Group
DCL	Dakete Company Limited
EPA	Environmental Protection Agency
GGL	Goldfields Ghana Limited
GPS	Ghana Police Service
JHS	Junior High School
LBAs	Local Buying Agencies
MAP	Mercury Abatement Project
NGOs	Non-Governmental Organisations
NYMG	Nana Yefri Mining Group
PMMC	Precious Minerals Marketing Corporation
SHS	Senior High School
SLF	Sustainable Livelihood Framework
TNMA	Tarkwa-Nsuaem Municipal Assembly
UMAT	University of Mines and Technology
UNDP	United Nations Development Programme

## ABSTRACT

Small-scale gold mining looked upon as a necessary evil has the potential of creating employment and generating revenue and hence economic growth and poverty alleviation. Small-scale gold mining operations are often unregulated and appear to be more destructive. It adversely impacts individuals, environment and communities with livelihood implications. The study therefore examined the socio-environmental impacts of small-scale gold mining operations in the Tarkwa-Nsuaem Municipality in Ghana. Data was obtained from households, miners, community leaders, Tarkwa-Nsuaem Municipal Assembly, the Minerals Commission and the Environmental Protection Agency by using questionnaires and interview guides. Secondary data sources were also used.

The study revealed that miners use both underground and surface mining in extracting mineral ore. Though there are many small-scale gold mining companies/groups, only 15 are licensed with a greater majority operating at the blind side of the law in the Municipality. The study again brought to bare that the impacts of small-scale gold are both positive and negative. Positively, it generates employment, income, promotes local economic development, boosts trade and its profitable over other economic activities. However, its inefficient exploitation has brought about serious environmental damages that have affected the livelihoods of many households as well as threatening the socio-economic lives of the people.

Individuals whom small-scale gold mining operations have affected adopt various coping strategies for their survival though not sustainable. Accordingly, it is important to regulate the activities of small-scale gold mining to make it sustainable and be able to harness its development prospects by putting in more efforts by all stakeholders especially the government.

Keywords: Coping strategies, Environment, Ghana, Livelihoods, Small-scale gold mining, Tarkwa-Nsuaem Municipality

## CHAPTER ONE

### GENERAL INTRODUCTION

#### 1.1 Introduction

Small-Scale mining as a global economic activity is carried out in many parts of the world. The United Nations generally defines it using a given production ceiling, the level of sophistication of minerals exploitation - any single unit mining operation with an annual production of unprocessed material of 50,000 tonnes, or less which is measured at the mine entrance (Aryee, et al., 2003). It is especially widespread in developing and underdeveloped countries where poverty is pervasive and endemic (Hentschel et al., 2002). It is an important economic activity in the informal sector in these countries in terms of its employment generation. Estimates by the International Labour Organization show that small-scale miners are increasing with millions of people depending on it; of which 20 million are directly involved in the mining, 5 million of whom are women and children (Geoviden, 2007). The rapid expansion of the small-scale mining sector in sub-Saharan Africa and its employment generation to vulnerable groups suggests its strong linkage to the hardships of people. Available evidences point to the fact that in sub-Saharan Africa, a typical small-scale mining camp contains workers having different skills and educational levels (Hilson, 2009).

In sub-Saharan Africa, the Sector has been argued to be chaotic and entrepreneurial-driven since it comprises of 'rush-type' activities (World Bank, 2005). It has been couched in the 'demand-pull' school of livelihood diversification where people subsist adequately from farming but choose to 'branch out' believing diversified income portfolios have the potential of bringing greater economic returns (Hilson, 2009). There are other narratives which couch small-scale mining in the 'distress-push' - type school. Here, people 'branch out' into small-scale mining due

to the fact that they face precarious financial situations with desperation to get out poverty (ibid). Another but most important school of thought hold the view that small-scale mining is increasingly becoming a permanent and an important part of Africa's rural sector. Though small-scale mining is fuelled by poverty, it is more than just a 'rush activity' and as such a deeply rooted industry (Childs, 2008). It has low entry barriers and enables entrants to rapidly escape poverty. It again offers a range of economic advantages for people across the globe (Banchirigah and Hilson, 2010).

Concerns have been raised of the need to ensure sustainability of livelihoods and environmental protection in small-scale mining communities. Krantz (2001) asserts that in analysing and discussing the concept of sustainable livelihoods, emphasis must be laid on various factors and processes either constraining or enhancing poor people's ability to live sustainably. Though it contributes to people's livelihoods, it is also considered as a major cause of environmental degradation and resource depletion in mining areas (Agyemang, 2010).

Small-scale mining has gained greater visibility but poorly understood and hence its unsustainable nature. In this regards, it is urgent now more than ever to ascertain the socio-environmental impacts of small-scale gold mining operations which has seen limited research in Ghana for the realization of the sector's full potentials.

## **1.2 Problem Statement**

The concept of small-scale gold mining has been introduced in legislation in Ghana with miners able to get official licence for operation. This notwithstanding, few small-scale gold miners have actually obtained such licensing. The Sector is therefore inadequately regulated, with respect to health, safety standards and environmental rehabilitation requirements. Small-scale gold mining particularly the illegal ones, commonly referred to as "galamsey" in Ghana is

difficult to control or monitor by the Environmental Protection Agency (EPA) and its allied state agencies. Such is the case in the Tarkwa-Nsuaem Municipality.

In the Municipality, small-scale gold miners mostly operate outside the law including the registered ones. There is therefore no straightforward and obvious difference between registered (legal) and unregistered (illegal) small-scale gold mining activities in the Municipality in terms of the study variables. Accordingly, and unless otherwise indicated, all explanations refer to both illegal and legal small-scale gold mining. It is imperative to understand that small-scale gold mining in the Municipality has contributed to economic growth of the area on one hand, with adverse effects on individuals, mining-host communities and the environment on the other. Small-scale gold mining is therefore looked upon as a necessary evil.

Small-scale gold mining operations have had wider environmental and social consequences in the mining communities with the change in socio-environmental dynamics unsustainable. The mining communities face social and environmental insecurities due to mineral resource endowment and perceived to experience 'poverty in the midst of plenty' (Obeng-Odoom, 2012). These problems are exacerbated by the fact that people depend on the land on which these mining activities are undertaken for their livelihoods.

Previous studies on small-scale mining have emphasized on technical and legal frameworks (The Minerals and Mining Act, 2006); poverty and economic development (Hilson, 2009); environmental consequences (Donkor et al., 2006); gender roles and child labour issues (Hinton et al., 2003) and issues of sustainable development (Amankwah and Anim-Sackey, 2003). Little is therefore known about the socio-environmental impacts of small-scale gold mining operations. The Study therefore focuses on finding ways to make small-scale gold mining

sustainable by looking at the mode of operations of small-scale gold mining companies and its positive and negative socio-environmental impacts in the Tarkwa-Nsuaem Municipality.

### **1.3 Research Questions**

Generally, the study seeks to ascertain the sustainability of small-scale gold mining in relation to its socio-environmental impacts in the Tarkwa-Nsuaem Municipality in Ghana.

Specifically, the Study answers the under listed research questions:

1. How can small-scale gold mining be made sustainable in the Tarkwa-Nsuaem Municipality?
2. How do small-scale gold miners operate in the Tarkwa-Nsuaem Municipality?
3. What is the contribution of small-scale gold mining to people's livelihoods in the Tarkwa-Nsuaem Municipality?
4. How has small scale-scale gold mining affected the environment in the Tarkwa-Nsuaem Municipality?
5. What coping strategies have been adopted by people adversely affected by small-scale gold mining operations in the Tarkwa-Nsuaem Municipality?

### **1.4 Justification of the Study**

Small-scale gold mining potentially creates employment and generate revenue (including foreign exchange) and hence poverty alleviation. It also causes negative social and environmental problems with implications for livelihoods. Consequently, most of the studies on small-scale gold mining have focused on its negative impact, especially on the environment. The negative impacts of small-scale gold mining dominate many studies and scholarly publications in Ghana at the expense of its positive impacts. There are inadequate studies on the mode of operations and issues relating to livelihoods of small-scale gold mining.

The study therefore intends to ascertain the overall impacts of small-scale gold mining. It is believed that findings from the study will generally contribute to knowledge sharing on small-

scale gold mining in Ghana and the Municipality in particular. It will again serve as a basis and an insight to the State and other development agencies with interest in small-scale gold mining related issues. The research will also serve as one of the fundamental basis for all those who will in one way or the other harbour the desire to conduct future research into this area of study.

## **CHAPTER TWO**

### **UNDERSTANDING SMALL-SCALE MINING AND ITS SOCIO ENVIRONMENTAL IMPACTS: A CONCEPTUAL OVERVIEW**

#### **2.1 Understanding Small-Scale Mining**

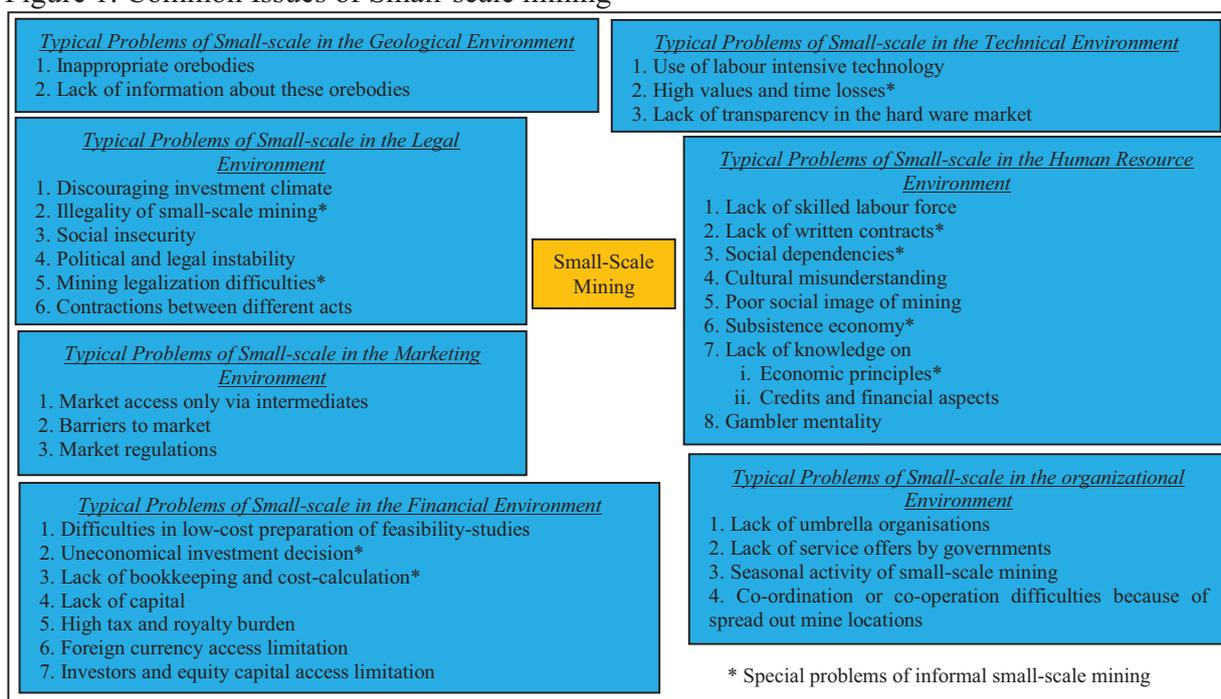
The term small-scale mining surfaced first in the 1972 publication of the United Nations, “Small-Scale Mining in the Developing Countries”. It was an afterthought on the donor agenda at the time but served an eye-opener to the economic importance of small-scale mining in developing countries (Hilson, 2009). It has been defined differently the world over due to its diverse nature (Mwaipopo et al., 2004).

It is largely a poverty-driven activity operated typically in poorest and rural areas of a country. Small-scale miners are largely seen as itinerant with poor educational background and few employment alternatives (The World Bank Group, 2001). According to ITDG (2001), small-scale miners are poor and depend on mining for living and apply rudimentary tools and techniques (picks, chisels, sluices and pans etc.) for mineral exploitation.

In recent times, however, the industry has seen constant growth resulting in the use of sophisticated equipment and processes. There have therefore been some controversies surrounding the earlier definitions of small-scale mining (Buxton, 2013). Some institutions and organizations now define small-scale mining in relation to its production ceiling or the sophistication level of the production process. Further analyses show the difficulties in generally defining small-scale mining. What constitutes a small-scale mine in one country may look quite large in another country. Aggregately however, various writers define small-scale mining by examining the characteristic features of small-scale mining which are recognized and stand out in different countries. Such characteristic features are Ownership; Capital Investment; Degree of

Mechanisation; Depth of Workings; Nature of Working; Employment; Size of the Deposit; Value; and Production (Opoku-Antwi, 2010). Each of these characteristic features of small-scale mining varies by country in relation to history of mining, macroeconomic situation, geological framework and legal conditions. Despite these variations, small-scale mining is characterised by certain conditions as shown in Figure 1.

Figure 1: Common Issues of Small-scale mining



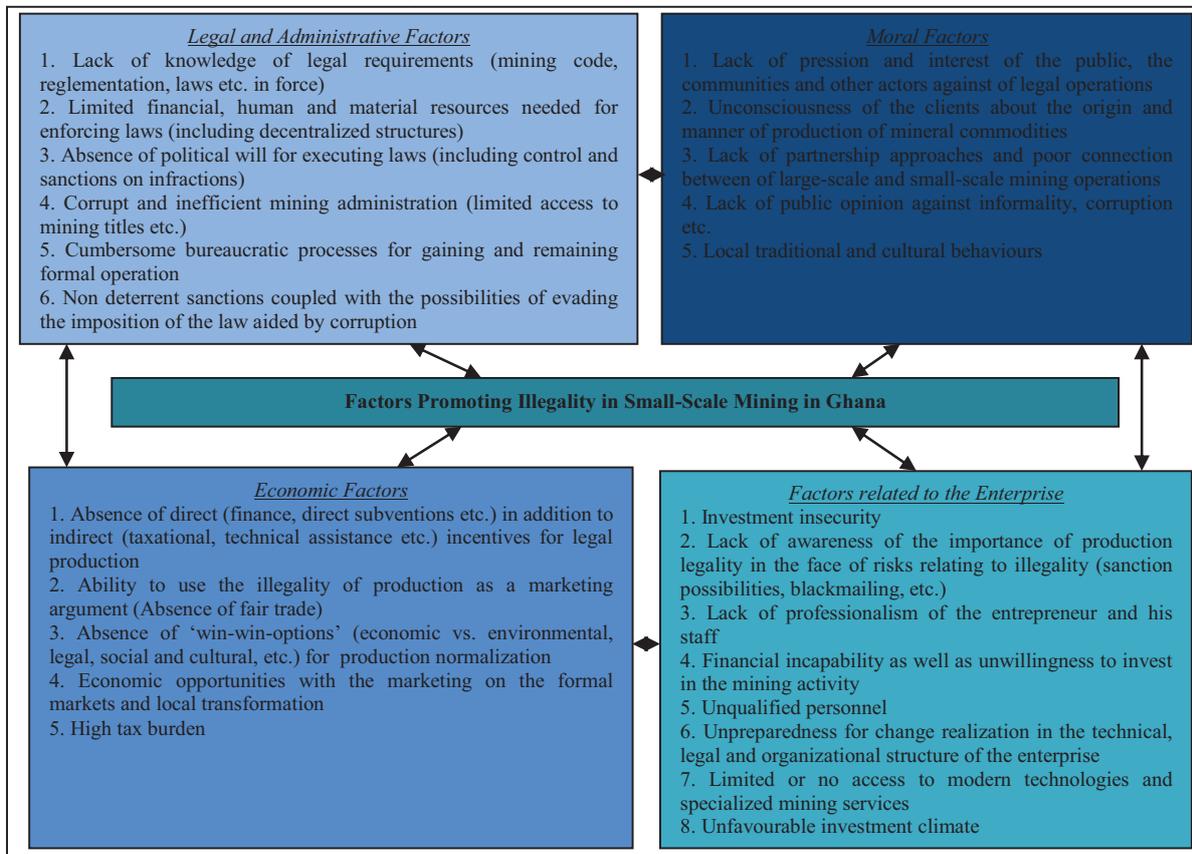
Source: Hentschel et al. (2002)

The Ghana Government (1989) defines small-scale mining as “mining (gold) by any method with unsubstantial expenditure by an individual or group of persons less than or equal to nine in number or by co-operative(s) made up of 10 or more persons”. According to the 1989 Small-Scale Gold Mining Law of Ghana, generally, any mining operation with a concession of land up to 25 acres for a three to four-year period is considered a small-scale mine. More specifically, three acres of a designated area is granted to a person or group of persons not more

than four; five acres to group of persons less than or equal to nine in number; and 25 acres to co-operative societ(ies) of 10 or more persons. According to Section 93 of the Act “a licensed person under section 82 (obtaining a permit before mining operation) may win, mine and produce minerals by an effective and efficient method; and shall observe good mining practices (health & safety rules) and pay due regard to the protection of the environment during mining operations”. Aryee, et al. (2003) defines small-scale gold mining to include artisanal gold mining (the use of rudimentary implements for operation) and the more sophisticated mining operations with a relative low level of production and a general limited capital investment requirement. However, in Ghana, there is no clear-cut differentiation between the two and hence both are referred to as small-scale mining.

It is important noting that small-scale gold mining in Ghana is grouped into two (2): licenced (legal) and unlicensed (illegal) small-scale gold mining. However, there is little organizational or technological differences between the two (Hilson and Potter, 2005) with the exception that legal mining operators secure tenure on a demarcated mineralized concession for a stipulated period of time. Illegality in Ghana’s small-scale gold mining sector has been attributed to government’s lack of capacity to ensure law compliance motivated by parochial interests relating to corruption, money laundering and similar illegalities enabled by illegal small-scale gold mining as Figure 2 depicts. For the purposes of this study and base on the 2006 Mineral and Mining Act (Act 703) of Ghana, small-scale mining is defined as the process of extraction of minerals deposits most commonly, gold by an individual, group of persons or co-operative(s) that work in small to medium sized operations with rudimentary and labour intensive mining techniques and unsophisticated technology with minimal capital investment and little consideration of environmental issues.

Figure 2: Factors Promoting Illegality in Small-Scale Gold Mining in Ghana



Source: With Modification from Hentschel et al. (2002)

## 2.2 Legal and Regulatory Framework for Small-Scale Gold Mining in Ghana

Various governments from the colonial era have enacted various legal and regulatory frameworks with regard to the mining sector in general and small-scale gold mining operations in particular. The 1989 Small-scale Gold Mining Law (PNDC Law 218) was enacted in pursuance of the Provisional National Defence Council (Establishment) Proclamation of 1981. The law legalized small-scale gold mining operations in Ghana. The law allows small-scale gold mining licence to be granted to persons who are citizens of Ghana and have attained the age of eighteen years. The Law again stipulates that a licence granted persons or group of persons other

than co-operative(s) should be three years or less from the issuance date in the first instance and may be thereafter renewed.

The Law prohibits miners from the use of any explosive in their operations. Miners are however permitted to buy mercury from any authorized dealer in quantities that may be reasonably necessary for mining purposes. Three years from the commencement of the Law, all persons engaging in small-scale gold mining activities were to be exempted from income tax payment and royalties in relation to their operations. The Law however failed to consolidate small-scale gold mining operations into the Mining Act. The need to revise the law led to the enactment of the 2006 Minerals and Mining Act (Act 703).

The Minerals and Mining Act, 2006 (Act 703) therefore consolidated the Small-scale Gold Mining Law, 1989 PNDCL 218 to reflect on new developments and thinking in the mining sector. The focus of the Act is on: mineral ownership and cadastral system; royalties; mineral rights; dispute resolution; rentals and fees; types of mining licences: reconnaissance licence, prospecting licence; mining lease; radio-active minerals; suspension, surrender and mineral rights cancellation; surface rights and compensation; industrial minerals; small-scale mining; and administration and miscellaneous provisions. The first 80 sections of the Act concentrates on large scale mining while sections 81 – 99 concentrate on small- scale mining. Sections 100 – 112 focus on administration and miscellaneous provisions.

The Act does not permit foreigners to own or directly engage in small-scale mining. It however permits foreign mining servicing companies to provide consultancy services, hiring and sale of equipment to the miners. However, due to poor oversight from the government, some local miners collude with foreigners under the pretext of hiring equipment and seeking consultancy from them only to form partnerships with them. This has increasingly added to the

number of illegal mining operations. The Act has made provision for the establishment of Small-Scale Mining Committees made up the District Chief Executive or his/her representative as the chairperson of the Committee; District Officer of the Minerals Commission; a nominee of the relevant District Assembly; a nominee of the relevant Traditional Council; an officer from the Inspectorate Division of the Minerals Commission; and an officer from the EPA to oversee the efficient and effective operations of small-scale mining in the mining districts.

### 2.3 Institutional Framework for Small-Scale Mining in Ghana

Institutionally, Ghana Governments' over the years have established a number of institutions to regularize small-scale mining operations. As Table 1 elaborates, it is the mandate of these institutions to provide supports services to ensure optimal exploitation of the Ghana's natural resources.

Table 1: Institutional Framework for Small-Scale Mining in Ghana

<b>Institution</b>	<b>Responsibility</b>
Ministry of Land and Natural Resources	i. Ensures sustainable management as well as judicious utilization of the country's lands and natural resources (forestry, wildlife and mineral resources). ii. The mines section of the Ministry advises and co-ordinates government policy on mining issues and review recommended licences and important documents and agreements related to the mining sector.
Minerals Commission	i. Recommends mineral policies as well as advise the government on mineral matters. ii. Liaises with government and the mining sector.
Geological Survey Department	i. Undertakes geological mapping, research and investigations (mineral resource, environment, groundwater management, land use planning and geohazards) to generate, collect and store geoscientific data and knowledge. ii. Conducts geological studies and prepares geological maps. iii. Ensures safety in the mines through its Mines Department.
Chamber of Mines	i. Takes care of mining operations in the country. ii. Handles mining communication information matters with government and other public and private bodies. iii. Discusses proposals for legislative bodies and negotiates compensation packages and benefits of miners.
Environmental Protection Agency	i. Protects the environment through policy formulation; economic, scientific and technological interventions that are needed mitigate any harmful developmental impacts including mineral exploration and processing.
Lands Commission	i. keeps legal records of exploration licences and mining leases. ii. Examines new licence applications and initiating policies relating to stool and state lands.
Land Valuation Board	i. Valuates property affected by mining operations
Forestry Commission	i. Manages the Ghana's forest

Previous Minerals Marketing Company	i. Buys from small-scale miners, precious minerals, such as diamonds and gold and sells them to enhance Ghana's foreign exchange earnings from the mining sector. ii. Promotes the development of precious minerals and jewellery industry through the grading, assaying, valuing and processing precious minerals in Ghana.
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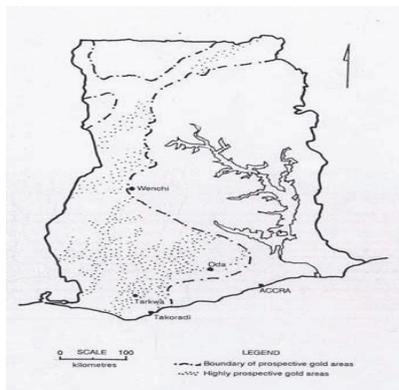
Source: Akabzaa and Darimani (2001); Hentschel et al., (2002); Opoku-Antwi et al., 2012

Notwithstanding the above discussed legal, regulatory and institutional frameworks enacted to regulate and provide a congenial environment for effective small-scale mining operations, weak institutional structures; women and child labour concerns; limited technical capacity; inadequate capacity to implement existing regulations and policies; inadequate financial support services; lack of political will; inadequate access to exploration and mining areas; and limited access to appropriate technology (and consequent environmental degradation) have over the years undermine small-scale gold mining development in Ghana. For small-scale gold mining to be used as a transformative tool for sustainable development therefore, these challenges must be holistically addressed.

## 2.4 Modus Operandi of Small-Scale Gold Mining in Ghana

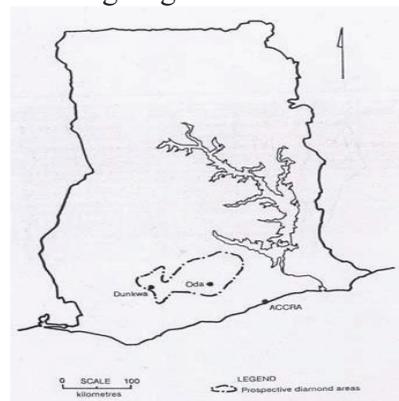
Ghana's geological formation favours small-scale gold mining and diamonds throughout the country (Figure 3 and 4) (Amankwa and Anim-Sackey, 2003). They are therefore the most important minerals that are mined on small scale basis in Ghana.

Figure 3: Prospective Small-scale Gold Mining Regions in Ghana



Source: NSR, 1994

Figure 4: Prospective Small-scale Diamond Mining Regions in Ghana



Typically for gold, small-scale gold miners usually organise themselves in different ways to extract gold in various parts of Ghana. The groups can range from groups of relatives or family members, ethnic based groups to groups of individuals with a shared vision of engaging in mining to gain income. These groups, whether legal or illegal, have leaders and sub-leaders who see to their mining operations. The leaders are usually the concessionaires or people appointed by them. They can also be family heads, owners of the land or the people who first discovered minerals in the areas of operation.

Small-scale gold miners have over the years used various local technologies to extract gold. Hilson (2001) posits that basic hand tools like pickaxes, shovels and sluice boxes are the most commonly used equipment. Occasionally however, water pumps, explosives and washing plants are used. Small-scale gold mining sites that feature the most advanced of machinery are, for the most part, rudimentary in design. Many small-scale gold miners in Ghana use inappropriate technology and have limited access and knowledge of the geology. Mine planning, grade control and equipment used in most cases are rudimentary. There are separate 'stations' for the most sophisticated of set-ups for performing all the needed activities of the gold-production processes. Styles et al. (2006) contend that though the current small-scale mining methods are archaic, crude and often maladapted from the large-scale mining sector, its operators have devised innovative ways to develop their own tools and technology and as such have been far from static or backward. They however conceded that there is still much to be done to improve the technology in the small-scale mining sector. In recent times, Chinese investors have introduced excavators which could either be bought or rented. However, many of the small-scale miners still use rudimentary and old techniques because they cannot afford the excavators. Consequently,

small-scale miners work longer hours as their techniques, tools and equipment for routine unit operations are usually inadequate and labour intensive.

Small-scale gold mining takes the form of primary ores (hard rocks) or secondary ores extraction (alluvial materials) which mostly occurs along water courses. In Ghana, four main methods of small-scale mining are employed (Styles et al., 2006):

1. Washing and panning for alluvial gold along the banks of streams and rivers;
2. Shallow near-surface pit alluvial/alluvial mining;
3. Underground hard rock (reef or lode) mining; and
4. Reworking tailings from the old large-scale mining mines.

For centuries in Ghana, the most common practice has been the washing and panning for alluvial gold along banks of streams and rivers. Here, small pits in the gravel beds of small and slow moving streams or in eddying pools on the shallow banks of larger rivers is dug. This mostly takes place on crests or hill sides or in sedimented valleys of ancient riverbeds and deeper alluvial and near surface oxidised primary deposits are exploited. Small circular pits or larger excavations are dug to locate the gravel horizon. The pits are usually unbenched but sometimes stepped in terraces to ensure stability.

Under the underground hard rock mining, miners employ either narrow vertical or inclined shafts (ghettos) to access the body of the ore. The shafts range in size depending on the shape. The Shaft is circular if it is one to two meters in diameter and square or rectangular if it is one meter by one to two meters. The depths of the shaft range between 10 - 50m. There are also chimney to sloping shapes with steps cut in with long 'snakelike' tubes bending to follow the reef line. Mining is done by selectively following the mineralised vein though not always easy or possible with many proven barren. The reworking tailings from the old large-scale mines usually

occur at abandoned large-scale mining sites or sites ceded out to small-scale mining groups through special arrangements. Some of these tailings are said to contain very good grades and most often a source of conflict among and between small and large-scale miners.

Generally, gold extraction begins with crushing the mineral bearing rock to form pebbles either by machine or hand. It is then stored in sacks in sheds after which the pebbles are passed through primary, secondary and tertiary grindings processes awaiting washing. It is then conveyed to the riverside and placed along washing blankets or hand-washed along riverbanks (Figures 5 and 6) to separate the valuable gold particles. Mercury is then used to pan the sediment and the amalgam roasted over fire in an open air (Figure 7) (Hilson, 2001). In most of the underground operations, miners work in spaces confined with poor ventilation and lighting.

Figure 5: Blanket Washing



Figure 6: Hand-washing



Figure 7: Roasting in Open Air



Source: Hilson, 2001

## 2.5 Socio-economic Impacts of Small-scale Gold Mining

In Ghana, Small-scale gold mining operations have contributed significantly to the economic and social structure of catchment areas of the mines. Most often, its negative impacts on communities and the nation at large overshadows its positive contributions. It has improved people's livelihoods within mining communities diversely which needs acknowledgment. Such positive contributions include generation of employment, income, and foreign exchange.

### 2.5.1 Impacts on Livelihoods

Small-scale gold mining affects livelihoods in two different ways. It negatively deteriorates capabilities and assets (tangible and intangible resources) as well as activities needed for a living. The activity poses great risks to indigenous communities and the natural ecosystems which they are closely linked to. Positively, it provides avenues and conditions that facilitate the creation of capabilities and assets (tangible and intangible resources) and activities needed for a living. It affects livelihoods in early seasons of activities where indigenous and traditional technical abilities are highly prominent with little or no capital investments. Table 2 depicts some impacts of small-scale mining operations on livelihoods. These manifestations on the lives of the people is dependent on institutional systems, processes and mechanism for promoting effective decision-making and development to maximize benefits for the people. Varied factors including local and national development policy frameworks and interventions; interplay between public and private sector in service delivery; creation of jobs and expansion of economic potential and traditional mechanisms; and systems for local capacity development influence the impacts small-scale gold mining have on livelihoods.

Table 2: Short and Long Term Effects of Small-scale Mining of Livelihoods

Effects	Short Term		Long Term	
	Positive	Negative	Empowerment	Impoverishment
Natural	Adoption of effective natural resource management practices	<ul style="list-style-type: none"> <li>i. Destruction of forest lands</li> <li>ii. Destruction of soils and plant species</li> <li>iii. Pollution of river bodies and underground water reserve</li> <li>iv. Increase in illegal mining activities</li> </ul>	<ul style="list-style-type: none"> <li>i. Re-forestation</li> <li>ii. Reclamation of closed mines</li> </ul>	<ul style="list-style-type: none"> <li>i. Dead fauna and flora</li> <li>ii. Polluted water bodies</li> </ul>
Human	<ul style="list-style-type: none"> <li>i. Development of entrepreneurial skills</li> <li>ii. Training on sustainable livelihood programmes</li> </ul>	<ul style="list-style-type: none"> <li>i. Increased incidence of STDs</li> <li>ii. Increased food and water contamination</li> <li>iii. Increased respiratory diseases</li> <li>iv. Destruction of formal</li> </ul>	<ul style="list-style-type: none"> <li>i. Increased accessibility to basic services</li> <li>ii. Improved health status</li> </ul>	<ul style="list-style-type: none"> <li>i. Poor access to social services</li> <li>ii. Poor health status</li> </ul>

		educational activities		
Social	<ul style="list-style-type: none"> <li>i. Provision of socio-economic infrastructure</li> <li>ii. Capacity training for traditional authorities</li> <li>iii. Provision of local governance infrastructure; e.g. Information centres</li> <li>iv. Increased networks; CBOs and CSOs activities</li> </ul>	<ul style="list-style-type: none"> <li>i. Destruction of basic infrastructure</li> <li>ii. Loss of civil and human rights</li> <li>iii. Destruction of traditional local governance systems</li> <li>iv. Adaptation to new cultural traits and systems</li> <li>v. Increased domestic conflict on ownership of resources</li> <li>vi. Loss of social networks as a result of relocation</li> </ul>	<ul style="list-style-type: none"> <li>i. Reduction in vulnerability</li> <li>ii. Reduction in exclusion</li> <li>iii. Increased advocacy</li> <li>iv. Increased investment from royalties</li> <li>v. Improved demand for local investment by mining companies</li> </ul>	<ul style="list-style-type: none"> <li>i. Increased vulnerability</li> <li>ii. Increased exclusion</li> <li>iii. Insecurity</li> <li>iv. Loss of community identity</li> </ul>
Economic	<ul style="list-style-type: none"> <li>i. Increased access to credits</li> <li>ii. Provision of employment opportunities</li> <li>iii. Creation and growth of productive activities (SMEs)</li> </ul>	<ul style="list-style-type: none"> <li>i. Landlessness (Loss of farm lands )</li> <li>ii. Loss of crops and livestock</li> <li>iii. Unemployment</li> <li>iv. Loss of customers and raw material suppliers</li> </ul>	<ul style="list-style-type: none"> <li>i. Improved income levels</li> <li>iii. Increased production and productivity</li> <li>iii. Satisfaction of basic needs</li> </ul>	<ul style="list-style-type: none"> <li>i. Low income levels for indigenous economic activities dependent on land</li> <li>ii. Low production</li> <li>iii. High cost of living</li> </ul>

Source: Developed from Baah-Ennumh, 2012

### 2.5.2 Impacts on Employment and Revenue Generation

The benefits of small-scale gold mining mainly manifest in the form of revenue and employment generation. In as much as it is not capital intensive, it requires sufficient manpower. Its major impact on employment generation is greatly visible in rural areas with few alternatives. It provides both part time and fulltime jobs which in most is the only available income sources available to people. It provides jobs and income for over 20-30 million poorest people in the world and supporting the livelihoods of five times the number. The activity has the effect of reducing rural-urban migration and promoting poverty reduction and local economic development. It offers the avenue for the development of basic skill development and transforms unskilled labour into semi-skilled and skilled workers. It provides excellent prospects for developing indigenous entrepreneurs because of its low entry barriers in terms of the needed capital and formal educational requirements. According to Yakovleva, (2007), the sector serves as a source of raw materials for local industries including the construction and jewellery

industries. Additionally, small-scale gold mining provides greater number of indirect jobs in other sectors in the form of production, transportation and services (trading and food vending).

The legalization of small-scale gold mining activities has had positive impacts on certain developing countries. Through legalization, smuggling channels are eliminated and thereby enables a complete capture of internally mined product. This successful containment contributes positively to sector revenues as well as foreign-exchange earnings (Hilson, 2001). For instance, in Ghana, small-scale mining contributed an over estimated 30% of the 3.6 million ounces of gold that was produced in 2011 (Agbenyega, 2013) and this be improved if the sector is well formalised and regulated.

### 2.5.3 Impacts on Poverty Reduction

Small-scale gold mining is central to reducing poverty, community capital increment and local economy diversification in many rural areas of developing countries. It is predominantly viable in areas having minimal infrastructure and where other industries did not function. It increases local purchasing power, demand for goods produced locally and allows exploring mineral deposits that are not viable for large-scale operation. Again, it leads to the discovery of many large-scale deposits and provides greater prospect for direct and indirect creation of jobs than large-scale mining. It stimulates rural economies by diversifying other economic activities including the manufacturing and communications sectors (World Wide Fund for Nature 2012). Small-scale gold mining potentially increases the livelihood security of people and contributes to reducing vulnerability as well as a source asset accumulation and investment.

## **2.6 Environmental Impacts of Small-scale Gold Mining**

Despite the socio-economic contributions of Small-scale gold mining, it faces numerous environmental problems. Its most commonly reported environmental impact involves clearing

vegetation (mostly tropical forest) for mining. The result is the degradation and fragmentation of wildlife habitats. Again, semi-mechanical techniques (water pumps, dredges, vacuums and hoses) are used to remove topsoil, riverbanks and riverbed sediments. In addition, the use of mercury is a key concern in small-scale gold mining (World Wide Fund for Nature 2012). The environmental issues associated with small-scale gold mining is summarised in Table 3.

Table 3: Environmental Impacts of Small-scale Gold Mining

<b>Small-scale Mining Activity</b>	<b>Observed or Anticipated Environmental Impacts</b>
Vegetation clearance and timber and non-timber forest products harvesting	<b>i.</b> Diminished sources of food <b>ii.</b> Blocking of habitat and migration paths <b>iii.</b> Deforestation leading to habitat loss <b>iv.</b> Increased vulnerability of forest ecosystems <b>v.</b> Eroding unsecured soil/unprotected earth that sometimes results in landslides <b>vi.</b> Soil degradation <b>vii.</b> Sedimentation and siltation <b>viii.</b> Behaviour modification <b>ix.</b> The use of important non-timber forest products for preparing food and constructing houses
2. Accessing deposits through physical removal of soil and rock	<b>i.</b> Affected areas are prone to erosion <b>ii.</b> Reduction in the capacity of affected areas to recover native ecosystem <b>iii.</b> Creates ecological niches for non-native vegetation <b>iv.</b> Releases and disperses corrosive dusts <b>v.</b> Air or water-borne toxic substances are detrimental to human health, soils, vegetation and water quality <b>vi.</b> Destroying riverbanks and riverbeds which impacts hydrological systems and aquatic ecology
3. Mining in or near rivers and streams	<b>i.</b> Loss of aquatic life <b>ii.</b> Reduce water quality (pollution) through increased turbidity <b>iii.</b> Sedimentation <b>iv.</b> Numerous open pits can cease the flow of smaller streams and waterways and clog springs <b>v.</b> Reconfiguring hydrological systems in an area by widening or dredging potentially affects hydrology downstream <b>vi.</b> Loosing and degrading aquatic herbaceous vegetation through riverbank impacts
4. Lack of backfilling during pits digging	<b>i.</b> Stagnant pools serving as breeding areas for malaria-carrying mosquitoes and waterborne diseases <b>ii.</b> Pits which have been abandoned pose injury and drowning risk <b>iii.</b> Previously mined sites not suitable for agriculture <b>iv.</b> Difficulty in topsoil reconstruction from worsened negative effects of erosion <b>v.</b> Difficulties in re-establishing original vegetation
5. Use of toxic chemicals (cyanide and mercury) in gold processing	<b>i.</b> Exposure to unmanaged cyanide releases creates 'dead zones' and localizes death of animals as well as birds and fish <b>ii.</b> Exposes humans and animal species to mercury emissions <b>iii.</b> Bioaccumulation of mercury up the food chain <b>iv.</b> Polluting drinking water
6. Establishing permanent and semi-permanent camps, villages and towns	<b>i.</b> Alteration of habitats for animals and their migration routes <b>ii.</b> Increase in resource competition and territorial warfare <b>iii.</b> Conflict/encounter between humans and wildlife because of higher proximity <b>iv.</b> Household waste mismanagement leading to air, ground, water and soil pollution <b>v.</b> Exposing gorillas and chimpanzees to human diseases <b>vi.</b> Exposure of humans to zoonotic disease (e.g. Ebola Hemorrhagic Fever and Anthrax)

Source: World Wide Fund for Nature 2012

In order to highlight some issues of small-scale mining in Africa, it is important to discuss some selected countries in African where small-scale mining is concentrated. In Tanzania, small-scale mining was not seen as an important livelihood issue in national planning. The times are however changing and there have been some shift (Mwaipopo et al., 2004) in which small-scale mining is now seen as a viable economic activity. The shift has been necessitated by the fact that agricultural activities have been shrinking with an associated increment in rural poverty. In Sierra Leone, the mining sector employs more people than all other sectors except for agriculture. The sector is however less developed with greater problems and poverty than other sectors. The situation is not different from Mozambique where small-scale mining is vital to rural livelihoods. Here, small-scale miners are mobile with mining activities seasonal in most instances (CASM Mozambique, 2009). In addition to the discussions from Ghana, these examples lend credence to the fact that small-scale mining in Africa is a major economic activity in mining areas supporting livelihoods. Mining operations are also hazardous and a threat to the environment with miners among the poorest of the poor.

## **2.7 Theoretical Framework**

In accordance with the nature of small-scale gold mining in Ghana, the theoretical basis of the study will be underpinned by the Classical Theory of the Informal Sector and the Tragedy of the Commons. The United Nations Development Programme's (UNDP) Sustainable Livelihood Framework is also used in examining the effects of small-scale gold mining operations on livelihoods. These theories are important in ascertaining the various factors and processes that enhance or constrain the ability of people to live in a socially, ecologically and economically sustainable manner. Their selection is dependent on their appropriateness, ease of application, and their explanatory power of the study variables.

### 2.7.1 The Classical Theory of Informal Sector

The unifying principle underlying informal sector literature stem from the fact that the sector is based on the capital-limited nature of the economy in which capital is in short supply. Given the limitations of the exogenously level of demand of the informal sector, it forces unemployed workers into it. It does not produce capitalists or workers, instead it constitutes a distinct social class. Informal sector technologies are rudimentary with characteristically low labour productivity (Gibson and Kelley, 1994).

Small-scale mining operations have emerged because of the inability of large-scale mines to absorb the labour force owing to mismatch of skills. IIED and WBCSD (2002) posit that in international development circles, small-scale mining has been identified as the most rudimentary part of the mining industry and it is usually defined as a low technology, labour intensive mineral processing and excavating activity. Small-scale mining operations are undertaken in the informal sector which are mostly outside legal regimes. Available estimates show that about 90 percent of small-scale mining operations are informal and thus illegal (Clausen et al., 2011). The Classical Theory of the Informal Sector is theoretically relevant to the study because of the rudimentary technology, labour-intensive but limited employees per firm and largely illegal with low productivity attributes of small-scale gold mining.

### 2.7.2 The Tragedy of the Commons

Small-scale miners obtain their ore from an environment which is treated as a common-pool resource for individual economic satisfaction (Agyeman et al., 2012). Accordingly, small-scale miners sometimes encroach large-scale firms' concessions. The common-property notion of mining lands encourages mining communities to see large-mining companies as a source of employment and in most cases, the large-scale mining companies give priority to locals in times

of employment. Cases in which large-scale mining companies cannot employ locals because of skills mismatch, the locals resort to small-scale mining by encroaching on large-scale mining concessions to compensate themselves.

In such cases, the small-scale miners treat water bodies in which they process their ores as common-property resources and mindless of water pollution. Again, through their activities, mercury is released into the environment with no remedial action for reclaiming mined lands. Such activities expose the entire society to small-scale mining's negative impacts. The Tragedy of the Commons is thus theoretically relevant to the study because of the treatment of the mineral bearing land as common-property where exploitation is done for individual interests with the consequences borne by the entire society.

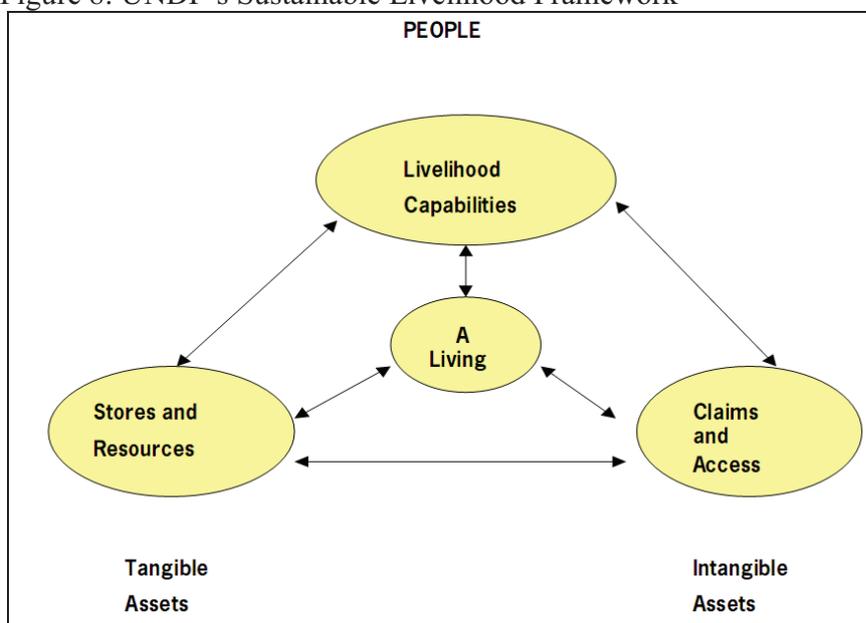
### 2.7.3 UNDP's Sustainable Livelihood Framework

Promoting sustainable livelihoods forms part of UNDPs overall 1995 Sustainable Human Development mandate. It involves the achievement of poverty reduction together with other strategies such as macroeconomic growth, community development and community-based natural resource management among others). The Sustainable Livelihood Framework (SLF) therefore provides a conceptual and a programming framework for sustainable poverty reduction (Krantz, 2001). Livelihood sustainability is seen as a function of the usage of asset portfolios on both short- and long-term basis. Accordingly, the UNDP employs an asset-based approach that emphasises promoting people's access to and sustainable use of assets on which they rely as fundamental to reducing poverty. The SLF thus stresses both coping and adaptive strategies.

Coping strategies are responses to specific shocks in the short-term while adaptive strategies are long-term changes in behavioural patterns resulting from shock or stress. People's asset status influences both strategies with implications for the composition of the assets

themselves which could be depleted or regenerated. Specifically, the SLF centres on technological improvements in helping people get out of poverty in addition to their strengths as opposed to needs; policy (macro-micro links) and governance issues; and constant assessment and support to sustainability. UNDP’s approach to promoting livelihoods looks at the linkages existing between livelihood capabilities, tangible and intangible assets that influence a living as shown in Figure 8.

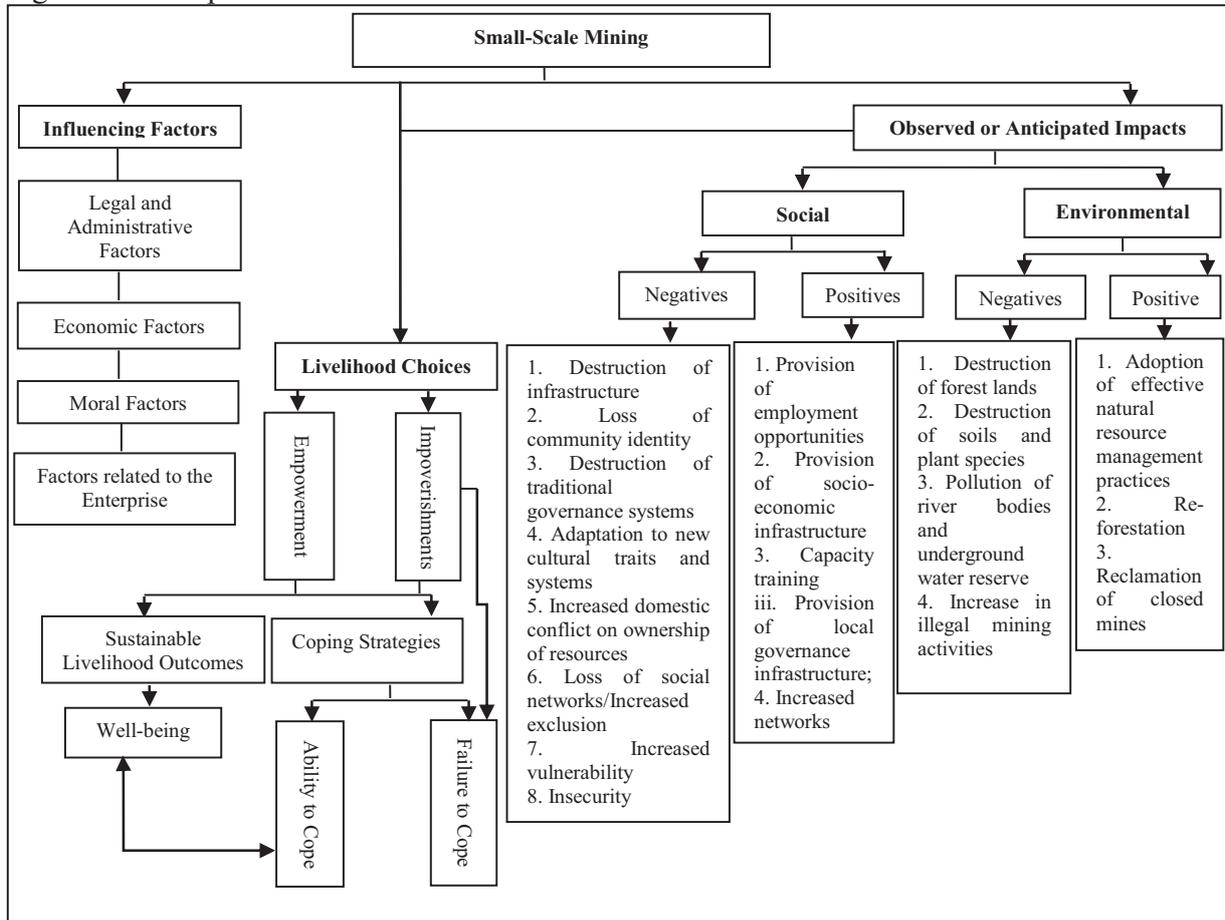
Figure 8: UNDP’s Sustainable Livelihood Framework



Source: UNDP, 1997

The SLF aims at identifying, designing and assessing projects and programmes that focus on poverty reduction and enhancing development of individuals and societies by drawing on a wider range of skills needed to address poverty. The emphasis is placed on livelihood capabilities and assets in the form of human, social and economic capital. For livelihood to be sustainable, it should be people-centred and participatory especially for the poor and embrace the four dimensions of sustainability identified as economic, institutional, social and environmental.

Figure 9: Conceptual Framework



Source: Author's Construct, 2016

It can be deduced from Figure 9 that the impacts of small-scale mining are either negative or positive. Negatively, it deteriorates the capabilities, assets (both tangible and intangible resources) as well as activities required for a means of living. Conversely, it positively provides avenues and conditions that facilitate the creation of capabilities, assets (both tangible and intangible resources) as well as activities required for a means of living. Apart from the fact that small-scale gold mining as an economic activity requires large acres of land for its operations, other equally important influencing factors come into play including but not limited to administrative, legal, economic, moral and factors related to the industry. These factors

influence individuals and households ability to have access to and use the mineral resources for livelihood. Small-scale gold mining poses immense risks to indigenous communities and the natural environment which includes but not limited to the destruction of infrastructure, increased vulnerability, increased domestic conflict on ownership of resources, loss of community identity, destruction of forest lands, destruction of soils and plant species and pollution of river bodies and underground water reserve. The positive impacts include provision of employment opportunities, provision of socio-economic infrastructure, capacity training, provision of local governance infrastructure, increased networks, more sustainable use of natural resources and enhanced capacity to manage risks and shocks. The impacts of small-scale gold mining require that people cope or adapt. People who either cope or adapt successfully see an improvement in their livelihoods while those who do not are faced with adverse impacts of small-scale mining. These adaptive and coping strategies either induce impoverishment or enhance empowerment and therefore suggest whether livelihood choices and actions have been effective, responsive and sustainable. How these strategies manifest in the lives of the people is dependent on how institutional systems, processes and mechanism for promoting effective decision making and development influence the translation of potentials to the benefit of people in mining communities.

## CHAPTER THREE

### BACKGROUND OF THE STUDY AREA AND RESEARCH METHODOLOGY

#### 3.1 Introduction

The trust of the chapter entails the major characteristics such as location, drainage, climate and vegetation, topography and demography of the study area in addition to other socio-economic issues. Also, the Chapter contains the research design and relevant methodologies for the study. The last part of the chapter is devoted to the major limitations of the study.

#### 3.2 Background of the Tarkwa-Nsuaem Municipality

The Municipality (situated between Latitude 4°5' and Longitude 5°5') is found in the Western Region of Ghana (Figure 10). It was created from the former Wassa West District under Legislative Instrument (LI) 1886 in 2007. It shares boundaries with Prestea Huni-Valley to the north, Ahanta West to the south, Nzema East to the west and Mponohor Wassa East to the east (Figure 11). Its total land area is 905.2km<sup>2</sup> with Tarkwa as the capital city. The Municipality is said to be the first place mining activities started in Ghana (Ghana Statistical Service, 2014).

Figure 10: The Municipality in Regional Context

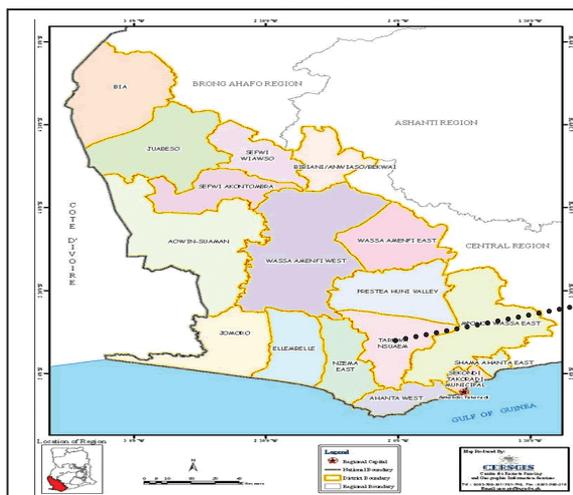
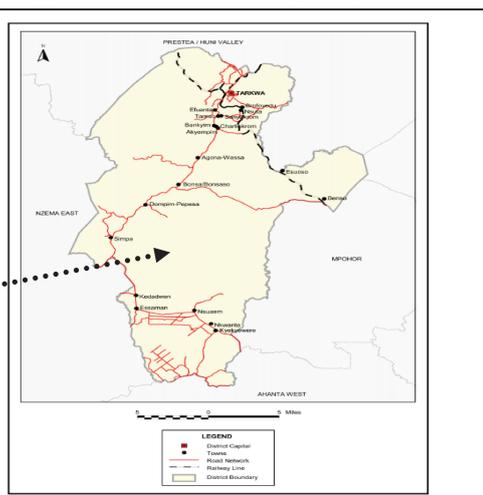


Figure 11: The Municipality in Context



Source: Tarkwa-Nsuaem Municipal Assembly, 2010      Source: Ghana Statistical Service, 2014

### **3.3 Physical Characteristics of Tarkwa-Nsuaem Municipality**

#### **3.3.1 Climate**

The Tarkwa-Nsuaem Municipality lies within the South-Western Equatorial climatic zone. Its temperature ranges between 26°C in August and 30°C in March. For most part of the year, The Municipality experiences an average sunshine duration at seven (7) hours per day. The Municipality experiences a generally high relative humidity all year round between 70 – 80 percent during dry seasons and 75 – 78 percent during wet seasons. The highest rainfall in Ghana is experienced in the Municipality. It experiences 1,500mm mean annual rainfall and a double maxima rainfall that starts from March to September. This high precipitation is the main source of water for all year round agricultural activities. Between November and February, the Municipality experiences very dry conditions with the blowing of the North-East trade winds.

#### **3.3.2 Vegetation**

The Tarkwa-Nsuaem Municipality lies in the rain forest belt with tree heights ranging from 15 – 40 meters. The most important economic trees are wawa, mahogany, sapele and odum. The Municipality is host to the Bonsa, Ekumfi, Neung South and Neung North forest reserves. Through increased human activities (excessive open cast mining, farming and indiscriminate lumbering), most of the virgin forests in the Municipality have become secondary forests. The gradual reduction in the economic and medicinal value of the vegetation impacts livelihood sustainability in the Municipality.

#### **3.3.3 Geology and Soil**

The Tarkwa-Nsuaem Municipality is part of the Birimian and Tarkwain geological formations. Due to their mineral potentials, the Birimian rocks are economically regarded as the most important formations. These geological formations explain the existence of high mineral

deposits in the Municipality and hence the presence of many small and large scale mining activities. The soil type in the Municipality is mainly Oxisols which are deep, open and acidic because of heavy leaching from high rainfall, humidity and temperatures. These reduce soil phosphorus, calcium and magnesium to acceptable levels for good plant growth. Cocoa, cassava, plantain, rubber, oil palm and maize are therefore extensively cultivated in the Municipality.

#### 3.3.4 Relief and Drainage

The Tarkwa-Nsuaem Municipality is generally undulating and has an average height of about 70 meters. Its highest elevation ranges between 150 and 300 meters above sea level. The Municipality is drained in a dendritic pattern by River Bonsa and its numerous tributaries.

#### 3.3.5 Demographic Characteristics

During the 2010 Population and Housing Census, the Municipality recorded a total population of 90,477 with relatively more males (51.6%) than females (48.4%) and a sex ratio of 106.5. The male dominance is attributed to the higher number of males migrating to the Municipality to seek for jobs in the mining sector. The Municipality has a youthful population with about two-fifth (38.1%) aged below 15 years.

### **3.4 Economy of the Tarkwa-Nsuaem Municipality**

The Tarkwa-Nsuaem Municipality is endowed with human and natural resources. These include mineral deposits, tourist attraction sites, soil and timber species, good climatic conditions, rubber and oil palm plantations.

#### **3.4.1 Mining and Quarrying**

Many communities in the Municipality have huge economically viable mineral deposits like gold, bauxite, manganese and iron-ore. The Municipality has three large-scale mining companies (Goldfields Ghana Ltd, AngloGold Ashanti, and Ghana Manganese Company). There

are also numerous small-scale mining operations providing employment to a significant percentage of the population.

#### 3.4.2 Tourism

The Municipality is blessed with lots of attractions including forest reserves, Bonsayirika and Kobriko Sacred Grooves and Lake Abribe. It hosts the site of the “Battle of Nsamankow” fought between the Ashanti’s and the British in which Governor Sir Charles McCarthy was killed. The Municipality again hosts the first mechanical dredge mining used in Ghana. The tourism industry is supported by highly rated hotels, guest houses and restaurants.

#### 3.4.3 Agricultural Activities

As high as 68 percent of labour force in the Municipality are employed by the agricultural sector and engage in crop, livestock and fishery production. Cocoa, oil palm, coffee, rubber and citrus are the major cash crops cultivated in the Municipality. Rice, cassava, maize, plantain, yam and cocoyam are the main cultivated food crops. There has been improvement in agricultural technologies (improved varieties, correct planting distance and use of weedicides and insecticides, timely weeding, post-harvest loss management and effective fertilizer application etc.) to enable farmers increase their yields. There is also a growing popularity for the cultivation of non-traditional export crops such as pineapple, bananas, citrus, cola, black pepper and mushroom in the Municipality. The cultivation of these crops has over the years diversified the local economy and boosted incomes of farmers. Accordingly to the Ghana Statistical Service (2014), there is a significant proportion of the farmers (20.4 %) engaged in poultry and livestock (pig, cattle, goat and sheep) production. There are also about 500 constructed and stocked fish ponds in the Municipality.

### **3.5 Socio-economic Infrastructure in the Municipality**

#### **3.5.1 Education**

There are both public and private educational institutions providing formal education in the Municipality. There are 56 public kindergartens, 59 primary schools and 42 Junior High Schools (JHS) in the Municipality. The Municipality again boasts of three public Senior High Schools (SHS), one Vocational School as well as a Public University (University of Mines and Technology [UMAT]). There are also 36 kindergartens, 34 primary schools, 21 JHSs, one SHS and a vocational school provided by the private sector.

#### **3.5.2 Health, Water and Sanitation**

The Municipality boasts of four hospitals, four health centres, eight rural clinics, 10 private maternity homes and 41 pharmacy and chemical shops. The Municipality has 69 boreholes, 25 hand dug wells and two small water facilities.

#### **3.5.3 Roads**

There are 80km trunk roads, 262.3km feeder roads and 38 km town roads in the Municipality. The road conditions in the Municipality are generally poor.

#### **3.5.4 Market**

The Municipality has six major marketing centres at Tarkwa (Market circle) Market, New Atuabo, Agona, Nsuaem, Mile 5 and Mile 10 1/2 markets.

### **3.6 Research Methodology**

The section entails the description of methodological approaches that were applied in the study. Many different methodologies are used in various types of researches to embody the research design as well as data collection and analysis. The section therefore justifies the adoption and use of the methodological approaches for the study.

### 3.6.1 Research Design

There are varied methods of conducting a research which can be categorised into three major research strategies: qualitative research strategies; quantitative research strategies; and mixed method designs (Burke et al., 2007). Ideally, a comprehensive research seeks to integrate both quantitative and qualitative methodologies. However, due to time and financial constraints, this is not always possible. Accordingly, the study uses a qualitative investigation. This was considered as the most appropriate method for this study to enhance the exploration and interpretation of the Study variables. The new area of study in addition to its exploratory nature demands an open and a more flexible research design either than a more highly rigid and structured research design. Also, it demands a participatory and collaborative relations in making decision and therefore the qualitative research approach.

### 3.6.2 Case Study Approach and Justification

The research was guided by a case study approach to unearth the factors influencing the study variables. Case study provides vicarious experience, in the form of full and thorough knowledge of the particular study (Hammersley and Gomm, 2007) as well as adding to existing experience and humanistic understanding (Stake, 2007).

The Tarkwa-Nsuaem Municipality was selected for the study for various reasons. The Municipality is part of the Birimian and Tarkwain geological formations. Due to their mineral potentials, the Birimian rocks are economically regarded as the most important formations. These geological formations explains the existence of high mineral deposits in the Municipality and hence the existence of many small-scale (only 15 small-scale gold mining operations are licensed with a greater majority unlicensed and operating at the blind side of the law) and large-

scale gold (three large-scale mining companies; Goldfields Ghana Ltd, AngloGold Ashanti, and Ghana Manganese Company) mining activities.

The Municipality therefore has huge economically viable mineral deposits like gold, bauxite, manganese and iron-ore. Mining activities have been going on in the Municipality for centuries. It is said to be the first place where mining activities started in Ghana. At the time the Geological Survey Department was established in 1913, underground gold mines had been operating in Tarkwa and Bogoso sites (Ghana Statistical Service, 2014). Small-scale gold mining provides employment to a large percentage of people in the Municipality and hence the choice of the Municipality as a case study.

### 3.6.3 Sources of Data

Data was garnered from primary and secondary sources. Primary data was obtained based on through an intensive field work in the Tarkwa-Nsuaem Municipality through the use of semi-structured questionnaires and interview guides. While the semi-structured questionnaires were administered to heads of households and miners, the interview guides were administered to heads of the institutions. Data was obtained from both licensed and unlicensed small-scale gold mining companies and community leaders to obtain firsthand information about small-scale gold mining operations in the Municipality. Primary data was again obtained from Tarkwa-Nsuaem Municipal Assembly, the Minerals Commission and the Environmental Protection Agency.

Secondary data was garnered from journals, reports, published documents, periodicals, the internet, newspapers, magazines, national and other relevant state and non-state institutions with interest in small-scale gold mining. The secondary data threw more light on the study variables under investigation as well as guide the enquiry process (Gatrell and Flowerdew, 2005).

Using multiple data sources (Yin, 1994) allowed for a thorough and holistic analysis of the study and eliminated possible biases that arises from the use of a single source.

#### 3.6.4 Sampling Techniques

Since the ultimate aim of this research is not statistical representativeness (Longhurst, 2003), coupled with the limited time frame and available resources, different classes of respondents and the different kinds of objectives to be achieved, different sampling techniques were employed. The researcher obtained legal (licensed) small-scale gold mining companies from the Minerals Commission. Base on that, two were randomly selected. Since the numerical strength of the illegal (unlicensed) small-scale gold mining companies could not be determined coupled with the lack of a master list of unlicensed small-scale mining companies, the researcher identified two based on snowball sampling technique.

Purposive sampling technique was adopted in selecting 20 miners (10 from both licensed and unlicensed small-scale gold mining companies/groups) for interviewing. Additionally, 50 respondents made up of traditional authorities, households heads, assembly members and opinion leaders were purposively selected for in-depth interviews based on their in-depth knowledge of the subject matter. Again, three institutions were purposively selected for interview due to their interest in small-scale gold mining in the Municipality to give specific information needed for the study. The multiple sources helped in the triangulation of responses.

#### 3.6.5 Data Analysis

The analysis of data proceeded in three stages: themes identification, descriptive accounts and interpretative analyses. Themes were identified from the data and inductively derived from the theoretical framework. These ensured that the identified themes remained grounded in the data (Fereday and Muir-Cochrane, 2006). The themes were then given meaning through

descriptive accounts and interpretative analyses by analysing and presenting the themes in the words of respondents. In some cases, direct quotes were used to embody the voices of respondents to ensure credible and reliable research findings. The analysis was therefore based on the following working hypotheses:

H1: Measures have been put in place to ensure sustainable small-scale gold mining in the Tarkwa-Nsuaem Municipality.

H2: Small-scale gold mining contributes positively to people's livelihood in the Tarkwa-Nsuaem Municipality;

H3: Small-scale mining operations pose a lot of environmental problems in the Tarkwa-Nsuaem Municipality; and

H4: People who have been affected by small-scale gold mining operations adopt coping strategies for their survival in the Tarkwa-Nsuaem Municipality.

#### 3.6.6 Ethical Consideration

Permission was sought from the study participants. They were informed of the voluntary participation in the study and that any decision to redraw at any point in time would be respected. Being aware of the importance of one's own positioning as a researcher, respondents were informed about the academic nature of the study without state, parastatal or any organisation's involvement and the fact that issues discussed would not be made public with reference to any specific person or name. The result was sincerity of communication and mutual trust.

#### 3.7 Research Limitations

Due to the high cost of travelling to conduct interviews, the researcher relied on a colleague Development Planning Officer in the Municipality to conduct the survey on his behalf. I therefore had no control over the information provided. It was again extremely difficult probing and allowing respondents to elaborate on answers provided due to the compressed nature of the questions. This was intentionally done to prevent respondent fatigue and subsequent low

response rate. In overcoming these limitations, data gathered were complemented with secondary data. It was again difficult obtaining information from the institutions. The institutions were unwilling to divulge information. They however provided the required data upon follow-ups with continual assurance that the information they provide will be treated with confidentiality.

Again, both licensed and unlicensed small miners were media as well as research fatigued because of the sensitive nature of small-scale gold mining activities. They were therefore reluctant to give information and in most cases very hostile. More so, the illegal small-scale gold miners were afraid of being questioned about the legality of their activities and consequent arrest. The little information they provided was triangulated with findings from other researches.

## **CHAPTER FOUR**

### **MODE OF OPERATIONS OF SMALL-SCALE GOLD MINING AND LIVELIHOOD ISSUES IN THE TARKWA-NSUAEM MUNICIPALITY**

#### **4.1 Introduction**

The Chapter provides the setting for an in-depth understanding of the operational mode of small-scale gold mining and livelihood issues. The analysis has been organized under themes that were identified from the data and inductively derived from the research questions, working hypothesis and theoretical framework.

#### **4.2 Background of Respondents**

The major economic activity of people in small-scale gold mining communities in the Municipality is mining for the miners and farming for the non-miners. The women are mostly involved in farming, trading and providing services to miners as their major livelihood activities. The men's livelihood activities revolve around farming and mining related activities. Other livelihood and income generating activities include lumbering, hunting, driving, masonry, carpentry and tailoring. It can therefore be said that mining communities in the Municipality are involved in primary economic activities.

These activities are affected by seasonality which makes them susceptible to vulnerability. Farming activities are done seasonally with farm produce only available after specific seasons of the year. Farming is again affected by miners taking over farmlands for gold mining. This phenomenon has affected livelihoods in the Municipality. Additionally, the dependent of most people on a single income generating activity which are mostly seasonal in nature make them vulnerable to small-scale gold mining's negative impacts.

### **4.3 Overview of Small-Scale Gold Mining in the Tarkwa-Nsuaem Municipality**

Small-scale gold mining is widespread in the Municipality because its geological formation is mineral laden. An interview with the Municipal Office of the Minerals Commission revealed that only 15 small-scale gold mining companies/groups are licensed with greater majority unlicensed and operating at the blind side of the law. In as much as the Commission is aware of the operations of some of the illegal miners, they have difficulties in stopping them. The Officer said this is primarily attributable to the operations of such miners in old and abandoned mines and most cases in remote and hard-to-rich areas. The Tarkwa-Nsuaem Municipal Assembly (TNMA) also lacks the capacity to mount 24-hour operation/guard on such illegal mining sites despite its awareness of the environmental, social, health and safety risks of their operations. Again, traditional authorities, community leaders, assembly members and opinion members interviewed alluded to receiving regular complaints on the activities of small-scale gold miners, both legal and illegal.

The Municipal Officer of the EPA revealed that Tarkwa, the Municipal capital itself is situated on an abandoned underground mine with an intricate network of inter-connected tunnels accessible through 64 different points called ghettos scattered around the township. The dotted ghettos make it possible to enter a mine site at one end and reappear at an entirely different location. This makes it entirely difficult to clamp down on the activities illegal miners. Following numerous confrontations between security agencies and residents who believe that security agencies are inept and in collusion with small-scale miners especially the illegal ones, the TNMA set up a committee made of the Bureau of National Investigation, Ghana Police Service (GPS), EPA and Minerals Commission to investigate the issues. The committee recommended the sealing of all openings of the ghettos to control and contain small-scale gold mining

operations. This is however yet to see the light of day with no justifiable explanation for the non-implementation of the committee's recommendations. The result is the aggressive nature of small-scale gold mining activities most of which are illegal and its associated negative impacts.

#### **4.4 Acquisition of Valid Mining Licence**

In realising the potentials of the small-scale mining, Ghana's Governments have over the years implemented varied measures aimed at encouraging small-scale miners to operate legally and sustainably. Under the Mineral and Mining Act, 2006 (Act 703) of Ghana, the Minister in charge of Lands and Natural Resources has the prerogative upon the advice of a technical committee formed by the Minerals Commission to grant mineral rights and licence. As was revealed at the Minerals Commission, only 15 small-scale gold mining operations are licensed with increasing underground and surface mining activities in the Municipality.

Interviews with miners revealed that procedures for securing mining licence is bureaucratic, complex and cumbersome associated with inherent delays in the application process. The miners argued that their livelihood is dependent on daily gold output from the mines and any delaying in the licencing procedure affects their livelihood. Accordingly, they have no option than to operate without a licence. Again, the study revealed weak and inefficient collaboration among various institutions responsible for granting mining lease and licence. It is widely perceived that law enforcement agencies have compromised on the operations of small-scale gold mining and hence their licencing. Majority of small-scale gold miners therefore operate without any valid mining licence and hence operating illegally.

#### **4.5 Acquisition of Land for Small-Scale Gold Mining**

The survey revealed that miners in the Municipality acquire lands for mining from chiefs, large-scale mining companies and family lands. There are others who do not acquire lands but

work on either of the lands as labourers. This corroborates the findings by Nyame and Blocher (2010) when they found that disregarding the fact the mineral resources are state property by law, stool lands in mineral resource rich areas are continually utilised and most often traded accordingly to existing customary laws as is the case in the Twakwa-Nsuaem Municipality.

Ghana Minerals and Mining Act, 2006 (Act 703) enshrines all minerals in the hand of the government of Ghana for the Ghanaian people. This is blatantly abused in the Municipality with landowners, chief and opinion leaders granting mining leases/licences for people to mine without any consultation with the government and government institutions responsible for granting mining leases/licences. The result is the unsustainable mining operations which negatively impacts the environment and livelihoods of people. This is exacerbated by the lack of effective enforcement of laws regarding small-scale gold mining.

#### **4.6 Overview of Small-Scale Gold Mining Companies/Groups in the Municipality**

Sustainable small-scale gold mining is imperative. The survey revealed that the present methods used by small-scale gold miners have not changed much from the past but the equipment used have significantly improved. While some miners use traditional methods by using simple tools like cutlasses, shovels, head pans, axes and pick axes others use mechanised methods through the use of hammer mills, excavators, drilling machines, generators, compressors, moist mechanisms, disc mills and pumps.

##### **4.6.1 Dakete Company Limited**

Dakete Company Limited (DCL) is a registered small-scale gold mining company. The Company began operations in 1990 in an abandoned old Gold Coast mine concession which it acquired under Ghana's 1989 Small Scale Gold Mining Law (PNDCL 218). The Company undertakes both underground and surface mining with about 54 all-male permanent workers. In

addition, DCL employs between 50 and 200 tenants/contractors (mostly illegal miners) at a time. It has six departments; Mining; Health, Safety and Environment; Processing; Asset Protection; Marketing; and Engineering. In 1992, DCL was recognised as Ghana's best small-scale gold mining company. Because of its outstanding performance, DCL merged with Alpha, a Chinese gold mining company as Dakete-Alpha. This led to a full mechanised mining in the Company's history. The merger however broke up in 1995 due to economic hardship.

The Company has laid down procedures to safeguard the interests of its workers. There are occasional in-service training programmes for members to upgrade their skills and build their capacity. Workers are also provided with safety materials for their activities. Interesting and surprisingly, to determine the level of water contamination, DCL periodically conducts surface water sampling and analysis.

#### 4.6.2 Nana Yefri Mining Group

Nana Yefri Mining Group (NYMG) started operations in 2008 after its licensing. Just like DCL, NYMG operates in an old mine shaft that is believed to have been in existence during the colonial era. The Group has various forms of leadership including concession owner and gang leaders. The Group generally operates in underground mines and owns 25 pits each of engages between eight (8) to 15 male workers.

Three departments oversee the Group's activities. Its general office handles finances, production and security; the electrical department is in charge of electrical and energy issues; and the pump department pumps out and controls the level of underground water. There are 30 permanent staff and 700 tenants/contractors who operate on shift basis. The Group uses various machines and equipment (compressors, water pumps, electricity plant, blower, grinding machine and flash light etc.) in its operations.

#### 4.6.3 The Akoon Group

The Akoon Group is an illegal group operating in abandoned pits left by Goldfields Ghana Limited (GGL), one of the large-scale mining companies that operates in the Municipality. It is made up of 30 men who have been operating for over 10 years. The pits are usually flooded during rainy seasons as they lack the requisite equipment to manage the situation. The Group lamented that this greatly poses danger to their lives and property. It does not have its own processing machine and hence individual members send their share of ores to different processing companies. They however have gold buying agents. The miners revealed that they sometimes stay underground for days in order to extract mineral ore.

#### 4.6.4 The Asamankakraba Group

The Asamankakraba Group (AG) operates on an old concession belonging to the GGL. The Group revealed that GGL is aware of their operations. A check from GGL confirmed the claim. Just like the Akoon Group, AG has been operating for over ten years and faces perennial flooding during rainy seasons. The Group is made up of about 100 workers and work in gangs of two to four with a gang leader. Unlike the Akoon Group, processing is done in situ.

### **4.7 Mode of Operations of the Small-Scale Gold Mining Companies/Groups**

Both licensed and unlicensed small-scale mining operations revealed that they all operate in abandoned old mines belonging to the GGL. The miners use both underground and surface mining in extracting mineral ore. In the surface mining, miners initially dig the ground and scoop out the soil. The soil is then handled severally before retrieving the ore. In the underground mining, hard formations are mined from underground workings. Here, miners dig pits and create small holes on the pits. The entrances of the pits are usually supported with timber. The fragmented gold bearing rocks are transported to the surface in bags for processing. The study

revealed that this method is labour intensive and very risky due to the high possibility of the entire system caving in if there are weak support systems or lack of it.

Unlike the unlicensed groups, the licensed companies use the requisite machines and equipment which are able to pump out underground water even in the rainy season. The licensed companies employ limited number of permanent staff who are skilled in their fields of operations and employ large group of contractors/tenants mainly from the unlicensed groups. These contractors/tenants apply the same skills they use as illegal miners.

In an interview with the Municipal Officer of the Minerals Commission, they are aware of this situation but it is very difficult to deal with them. This is primarily because many of the mining concessions are owned by opinion leaders, influential or politically connected people. Also, some of the small-scale mining operations take place on concessions of large-scale mining companies that are expected to deal with and check their operations. This however never happens for reasons best known to them. It again came to light that some of the miners believe the minerals are gift of nature to their communities and therefore have every right to it in whatever way they can get it.

Additionally, the miners do not see the need to follow any cumbersome and bureaucratic procedures to mine what nature has given them. The views of some of the miners also revealed that various political leaders recognise their existence and as such pay them visits at their sites to campaign with the promise of helping them when in power. In their view, once they are recognised by politicians during political campaign periods, they expect them to recognise and help them when they are in power. These beliefs and political support make it difficult and if not near impossibility to enforce and monitor compliance with existing laws and regulations on small-scale gold mining.

#### **4.8 Gold Processing in the Tarkwa-Nsuaem Municipality**

There are independent gold processing groups who process ore from small-scale gold miners not having their own processing plants. The study revealed that many of the techniques, tools and equipment used by the gold processing groups are obsolete and crude. Some of the identified tools and equipment were mercury, basins, crushers, sacks, sluice boards and blankets. The ore is processed in a systematic off-loading process of stones into a crusher for crushing and smoothening. The jaw crushers and the hammer mills are used as the primary crushers. Disc mills are used as secondary crushers. The crushers break the stones into smaller particles to make it possible for the milling machine to break the particles into smallest form. The smoothening machine is then used to mill the semi-final particles so it can easily be washed on the sluice or washing board which are locally made with iron sheets or hard wood and lined with blankets, towel and/or carpet so that the smaller gold particles can settle on them. This is followed by the washing of crushed and smoothened ore to obtain gold particles in addition to washing of blanket in water.

Afterwards, gold concentrates which are black in colour are cleaned with rubber pans and missed with mercury. This process separates gold from black sand. If the purity of the gold is not perfect, acid is used to purify it. It was worrying to find out that miners keep mercury in bottles and use it freely without any protection claiming it is harmless. Amalgamation is the final extraction process. This is usually done by rubbing mercury into the concentrate with bare hands and happens in residential areas as depicted in Figure 12. Mercury is used because gold particles have strong affinity for mercury and adheres to it to form a pasty, dough-like amalgam. Blowtorches is then used to heat the amalgam or over an open flame so that the mercury can be evaporated to leave small gold particles.

Both the licensed and unlicensed small-scale miners responded as being aware and received education on Mercury Retorts through several workshops and seminars held for them under the Mercury Abatement Project (MAP). They are however yet to adopt it. Small-scale gold miners being risk averse explained they are more comfortable working with their crude and outmoded technology believing that it is faster. UMAT in collaboration with the Gesellschaft für Internationale Zusammenarbeit (GIZ), European Union (EU) and Ghana Chamber of Mines offer technical assistance to small-scale miners in the Municipality. However, since such assistance comes at a cost, miners are reluctant to consult the institutions for assistance in terms of efficient and new mining methods, mining ethics and operational guidelines which are essential for their sustainable operations.

Figure 12: Gold Processing with Mercury in Residential Area



Source: Baah-Ennumh (2012)

According to estimates by United Nations Industrial Development Organisation (UNIDO), mercury amalgamation from small-scale gold mining accounts for an estimated 1,000 tons of mercury released per year with as high as 95% of all mercury used released into the environment. This thereby dangerous to environmental, economic and human health (Blacksmith Institute, 2011). Interviews with the miners revealed that they have limited understanding and are oblivious of the impacts of their operations on the environment and lives. This problem is compounded by the absence of clear guidelines on the handling and disposal of mercury in

Ghana's Mercury Law, PNDC Law 217 of 1989. The Law allows miners to purchase mercury from only authorised mercury dealers. It stipulates small-scale gold miners to observe good mining practices in mercury usage without defining the constituents of good mining practices in mercury usage. This has given a leeway to small-scale miners to handle and indiscriminately dispose of the chemical at their discretion.

#### **4.9 Licensed Buying Agents**

There are Local Buying Agencies (LBAs) in the Municipality providing ready market for refine gold of small-scale miners. These LBAs are expected to work closely with the Precious Minerals Marketing Corporation (PMMC). With the influx of foreign gold buyers especially Lebanese and Indian, there have been decreases in the amount of gold purchased by the PMMC from the LBAs. This situation has prevailed notwithstanding the fact that if any LBA is withdrawn from the PMMC if it is unable to supply gold to the PMMC for a period of three months.

There are about 10 LBAs and sub-agents in the Municipality with an association of small-scale gold buyers called Purchasing Cooperatives. It exists to safeguard the interest of all entities that aim to revamp small-scale gold mining. It also undertakes corporate social responsibility within the Municipality. It has for instance constructed a washroom for the Municipal Police Office to improve its sanitary conditions. It again pays taxes to the TNMA and the Internal Revenue Service.

#### **4.10 Small-Scale Gold Mining and Livelihood in the Tarkwa-Nsuaem Municipality**

##### **4.10.1 Introduction**

Small-scale gold mining is a major livelihood source for most people especially the youth in the Municipality. Its most obvious contribution to development at the household level is

related to household economic welfare. This household economic welfare benefits directly impact on total community development. The study showed that small-scale gold mining has some perceived positive impacts in relation to its contribution to livelihoods as outlined below.

#### 4.10.2 Small-scale Gold Mining as Source of Quick Money

Small-scale gold mining in serving as a major source livelihood contributes significantly to poverty alleviation and promotes community development. The study revealed that most people are attracted into and retained in small-scale gold mining because of its quick economic returns and an avenue for getting rich quickly in comparison with incomes from other economic activities such as farming. Correspondingly, most youth drop-out of school at the JHS level to work in small-scale gold mining to survive motivated by poverty and get-rich-quick attitude.

One striking issues that came up here is the compensation package to farmers affected by small-scale gold mining. Ghana's 1986 Mining and Minerals Law (PNDC Law 153) has no well-defined guidelines for assessing deprivation of land use and its corresponding compensation package. This usually results in tensions between miners and affected farmers. Some affected farmers confirmed some degree of compensation for them. They however bemoan the fact that the compensation packages are woefully inadequate with due consideration to the benefits their farms would have generated had it not been destroyed by scale-scale gold mining.

#### 4.10.3 Small-scale Mining as Source of Employment

Small-scale gold mining has become a major source of employment in the Municipality where poverty is pervasive, livelihoods are unmanageable and non-existence and/or low-paying jobs in others sectors. During the study, it was revealed that small-scale gold mining is a major employment source to the youth especially. People secure employment in the sector and do various kinds of work ranging from ground digging to washing of final product. Respondents

indicated that small-scale gold mining offers excellent employment avenues because of its low entry barriers in terms of educational requirements and capital needs. This facilitates indigenous entrepreneurship development. The sector again provides raw materials such as construction materials and jewellery to local industries.

It is a well-known fact that illegal scale-scale gold mining provides several employment opportunities relative to legal small-scale mining. The combined effect of the two is correspondingly greater. This is particularly so in mining rural communities where other jobs are inadequate and mostly non-existing. This was corroborated by the Minerals Commission which confirmed that scale-mines employ about 60% of the mining labour force in Ghana. According to the Ghana Chamber of Mines (2008), there are around 200,000 people in illegal small-scale mining with only 30,000 people in legal mining. The sector again generates indirect jobs in other sectors resulting from its demand for production, transportation and other services. This covers gold buyers, traders, goldsmiths, food vendors, water sellers and the sale of other consumables. The effective management of the sector is therefore imperative for harnessing the sector's full potentials in providing employment.

#### 4.10.4 Small-scale Mining and Local Economic Development

By providing income and employment, small-scale gold mining serves as a source of economic empowerment. It offers a mechanism for human welfare and sustainable livelihood. Continual dependence on a single source of livelihood has the potential of triggering vulnerability when there are price fluctuations and seasonal imbalances. This is more critical with experimental exploration and low productivity in the small-scale gold mining sector. It was reported by miners that they reinvest their returns in other occupations including housing, trading and artisan. This provides evidence for miners' desire to diversify their livelihood recognising

the eccentricity of their activity. It therefore becomes important to provide interventions in the form of capacity building to ensure a well-diversified and thriving local economy. By so doing, local inhabitants' capacity is built in other occupations rather than mining to enhance competitiveness and encourage inclusive and sustained growth.

Small-scale mining as a major source of income increases rural wealth which is used to support investments in agricultural and non-agricultural pursuits and thereby increasing options available to mining communities (UNEP, 2006). Interviews with traditional authorities and opinion leaders revealed that despite its negative impacts, small-scale gold mining contributes to community development. It has helped reduce crime rates among the unemployed population who either wise would have resorted to criminal activities. Again, it was revealed that some feeders have been constructed linking mining sites. These roads open up communities and are used by farmers in accessing their farms as well as transporting goods and services. The interactions between migrants and local miners have again promoted trade and other commercial activities in the Municipality. The household interviews revealed that trading is beneficial when miners are progressing and vice versa.

#### 4.10.5 Other Economic Activities Generated by Small-Scale Mining

There are other numerous economic activities generated by small-scale gold mining in the Municipality. These activities include food vending, drinking spot and transportation services either on the mining site or nearby communities. As shown in Figure 13, charcoal burning is an activity that has been increasing due to the extensive clearing of forest by small-scale gold miners.

Figure 13: Charcoal Burning Activities in the Municipality



Source: Baah-Ennumh (2012)

The most vibrant of these activities is transportation services. This is due to the frequent movement of people in and out of the Municipality due to its vibrant mining activities. Again, most of the equipment, tools and other goods and services used by small-scale miners are brought into the Municipality by the transport services. There are other trading activities boosted by the mining sector including the sale of clothing, domestic items and cooking utensils. There are also a lot of hawking activities that go on at the mining sites. Shops of various sizes have also been opened to sell items mostly used by small-scale gold miners including flash lights, sacks, sandals and rubber pans.

#### 4.10.6 Profitability of Small-scale Mining over Other Economic Activities

It was evident from the interviews that small-scale gold mining is more profitable than other economic activities in the Municipality. Farming is the major economic activity in the Municipality. It is however seasonal in nature. Most people therefore prefer to go into small-scale gold mining rather than to farm and/or trade motivated by its quick returns and profitability. People again perceive farming as difficult and takes a longer time to harvest produce and earn a

living out of it. Majority of respondents believed that small-scale gold mining leads to improvements in peoples' lives. This was explained by the sector's outstanding performance in bringing about improvements in income levels. Through this income improvement, they have been able to enhance their physical capital base by being able to build and renovate their houses, buy cars that are used to support their activities, meet the basic needs of their families and more importantly, being able to support their children's education which would not have been possible without small-scale gold mining.

#### **4.11 Ensuring the Sustainability of Livelihoods in the Tarkwa-Nsuaem Municipality**

Over the years, natural resource exploitation by powerful few is causing alarming changes to the natural environment the world over. This often harms the most vulnerable who depend on natural resources for their livelihoods (UN, 2010). To promote sustainable livelihoods therefore, Scoones (1998) calls for the need to put in place interventions that can help mining communities in coping with and recovering from stress and shocks while at the same time enhancing and maintaining capabilities and assets that will not undermine the natural resource base. In the Municipality, many interventions have been put in place to sustain livelihoods. These measures are championed by both governmental and Non-Governmental Organisations (NGOs).

At the state level, various laws, acts, regulations, enactments and codes have been enacted to sustain livelihoods. The Minerals Commission and the EPA are charged with ensuring compliance but are under-resourced to effectively control and monitor their implementation to sustain livelihoods. The TNMA collaborates with corporates bodies to undertake sustainable alternative livelihood projects for mine affected communities. In an effort to sustain and diversify livelihoods in the Municipality, the traditional council instituted efforts to train the

youth in bamboo making. NGOs have also through advocacy and other activities contributed in ensuring livelihood sustainability in the Municipality. These interventions are however done with limited and/or little consultation with all relevant stakeholders and hence their continual failure. Though small-scale gold mining has provided livelihoods to people in the Tarkwa-Nsuaem Municipality and empowered them economically, it presents critical issues of livelihood and environmental sustainability.

## **CHAPTER FIVE**

### **SMALL-SCALE GOLD MINING AND THE NATURAL ENVIRONMENT IN THE TARKWA-NSUAEM MUNICIPALITY**

#### **5.1 Introduction**

The Chapter discusses the negative impacts of small-scale gold mining in the Municipality. These impacts are done within the livelihood framework and focus on vulnerability contexts considered as external factors which can change the ability of people to make meaningful living. Small-scale gold mining presents critical issues of sustainability resulting from conditions that erode mining potentials. It therefore brings to bare environmental sustainability and sustainable development issues which are expected to maintain sound and regenerative natural environment that support livelihoods. Some evidences of the negative small-scale gold mining impacts in the Municipality are discussed below.

#### **5.2 Environmental Impacts of Small-Scale Gold Mining in the Municipality**

The inefficient exploitation of gold has brought about serious environmental damages (land degradation, deforestation, biodiversity and natural resource loss) that have affected the livelihoods of many households. The household interviews revealed that small-scale gold mining activities destroy and degrade ecosystems and thereby affecting other livelihood activities such as farming, hunting, firewood gathering and logging. Small-scale gold miners operate close to homes and roads and hence very destructive and make lives unsafe. There were also complaints to the effect that small-scale miners block footpaths to people's farms during their operations and without any alternative tracks, farmers are unable to access their farms.

Extensive vegetation and land areas in the Tarkwa mining areas are destroyed for surface mining. Over 70% of Tarkwa's mining area has been taken over by open pit mining concession

(Akabzaa and Darimani, 2001). Agricultural lands are destroyed for mining purposes with inadequate or no compensation packages. Again, the agricultural sector is gradually being abandoned by the youth to resort to mining that has been perceived as a quick way to get rich. The combined effects of these practices cause low crop yields and biodiversity loss leading to food scarcity and affecting overall livelihood

There are also widespread health related diseases resulting from air, water, soil and dust pollution from the uncontrolled use of chemicals. Small-scale gold miners operate on daily subsistence basis without due consideration to the impacts their operations have on the environment. People view small-scale gold mining as unprofitable with degrading impacts on the environment and that nothing that destroys can be considered good or profitable. It is dirty, unprofitable and threatens the main physical capital stock such as farm lands and lands for other activities. The words of an Assembly member are worth echoing. *“Small-scale mining is not that bad comparing its positives with the negatives. In as much as it profitable, we cannot rule out its negative impacts on our environment especially land and water bodies. We only want it done in proper ways such as reclaiming lands after use and protecting water bodies. More importantly, their activities must be regulated, monitored and controlled”*.

#### 5.2.1 Small-scale Mining and Loss of Farmlands

Land is a valuable asset for both miners and non-miners upon which their livelihoods depend. It is not uncommon to see farmlands taken over by small-scale gold miners in the Municipality. This practice (Figure 14) is a common shock. This results in constant tension and conflicts between farmers and miners. Interestingly, the miners always win at the expense of farmers due to widespread support for small-scale gold mining be it legal or illegal. This phenomenon affects the production capabilities of farmers as they have to travel long distances

to acquire new farm lands. The gradual and sometimes unexpected taking over of farmlands have led to low agricultural productivity especially foodstuff in many parts of the Municipality. This implies constant hardships, poverty and hunger in the face of high living standards.

Figure 14: Destroyed Vegetation Cover in the Municipality



Source: Baah-Ennumh (2012)

This is corroborated by André and Gavin (2013) who assert that at the local level, there are numerous environmental and social challenges presented by small-scale mining including destroying farmlands to individual communities. The widespread illegal operations are testament to the fact that many small-scale mining concessions in the Municipality were transferred unjustly to the miners against the background that only state institutions are mandated to issue mining licence. Ironically, farmers who lose their farmlands to miners are not adequately compensated and thereby making them worse off. A farmer lamented *“all our farmlands are gradually being taking over by small-scale gold miners without any benefit to us. It is sad to say our livelihoods are gradually being eroded without any compensation while the appropriate authorities sit unconcerned. How I wish the government does something about this cruelty and ‘broad-day murder’.”*

### 5.2.2 Small-scale Mining and Water Bodies

A major problem caused by small-scale gold mining in the Municipality is water pollution. This concern was expressed by all stakeholders during the study. It occurs through the seepage of heavy metals into underground water and pollution of surface water through mercury contamination. The spillage of mercury and other chemicals into water bodies raises major public health concern and threatens the health of people in the Municipality. In collaboration with Wardell Armstrong, UMAT and British Geological Survey under European Union Development Fund Mining Sector Programme in Ghana, have undertaken a mercury abatement project in small-scale mining in Ghana. The World Bank and GIZ played a vital role in this regard but little impact has been made.

Most small-scale gold miners process their ores near rivers and streams and wash the materials into water bodies thereby increasing the turbidity of water bodies. Underground mines are dewatered with no regard to water quality. Most water bodies in the Municipality have been polluted so much that they have turned muddy and brownish in colour and hence unpotable and unwholesome for other activities. This is a critical challenge as people in the Municipality mostly depend on underground water. It is also important to note that the release poisonous chemicals into water bodies do not only pose threat to human life but also to aquatic life. Small-scale miners also sometimes destroy and divert water courses (Figure 15) to facilitate their operations; most often to the mining sites to be pumped to wash gold ornaments.

Figure 15: Siltation and Pollution of River Bediabewo in the Municipality



Source: Baah-Ennumh (2012)

### 5.2.3 Small-scale Mining and Uncovered Pits

One major environmental impact of small-scale gold mining is destroying the natural environment through the creation of numerous deep pits and trenches. Small-scale gold miners haphazardly create deep pits and trenches and leave them uncovered even when their operations are over. The study revealed that these pits act as death traps and take the lives of both humans (most of whom have nothing to do with mining) and animals (Figure 16). In an interview with the EPA, it was revealed that some of the pits have partially been covered by vegetation and as such increasing the danger associated with them.

Figure 16: Abandoned Mine Pits with Some Covered by Vegetation in the Municipality



Source: Source: Baah-Ennumh (2012)

The pits are sometimes located in footpaths to farms in addition to destroying the farmlands. The miners also scoop off the top soil in the course of their operations which reduces soil fertility and promotes soil erosion. All these results in low crop yields and return to farmers. One major impact of the uncovered pits is acting as breeding grounds for disease causing organisms through stagnation of water in them. These pits breed mosquitoes, a malaria causing vector in addition to other water related diseases.

#### 5.2.4 Small-scale Mining and Health

The Municipality is fraught with numerous environmental and mining related diseases as well as mine accidents. Such disease includes malaria, diarrhoea, skin diseases, acute mercury poisoning, upper respiratory tract infection, ulcer, kidney damage, silicosis and domestic accidents. Mercury released into the environment is inhaled by miners and mining communities in general. This exposes not only miners but entire communities to a lot of health related problems including those listed above. Mercury used in gold processing get settles in the environment or circulates and then absorbed by various living organisms.

In as much as small-scale gold miners are aware of these impacts through MAP, they sacrifice their health and those of others in exchange for the quick returns from mining. Also, dust pollution causes persistent cough. The interviews with the miners revealed the hazardous nature of small-scale gold mining which leads to waist pains and accidents. One miner bemoaned *“our work is dangerous and we know it. You can easily get hurt or killed. We can only be cautious but accidents can happen at any time. We only pray and hope they do not happen”*.

### **5.3 Small-scale Gold Mining and other Social-economic Impacts**

The concentration of small-scale gold mining threatens the socio-economic lives of the people. Aggregately, there is constant pressure on socio-economic wellbeing, service provision,

availability of housing and general infrastructure provision. These are reflected in the overall high standard of living: high food prices and high accommodation cost; child labour: school dropout and absenteeism and other vices such as drug abuse, teenage pregnancy and overall insecurity. Food and accommodation prices are generally beyond the means of ordinary people. There is general food shortage due to the shift of labour into the mining sector from the agricultural sector. Also, losing farmlands to small-scale gold mining has deprived people of their traditional sources of livelihoods. The cost of hiring a room and buying food items in the Municipality is relatively higher compared to neighbouring districts. Most often, “other” tenants are evicted from their rooms if “mining” tenants come with higher rents. It is therefore difficult for ordinary people living in the Municipality.

The risky nature of small-scale gold mining induces miners to resort to addictive drugs and other stimulants to help them perform. There is also a general sense of insecurity resulting from mining close to people’s homes and major roads, uncovered pits and trenches and blocking of footpaths to farms. The sporadic raids on illegal operators also make life dangerous and insecure. Due to the general high standard of living in the face of perverse poverty in the Municipality, young girls offer themselves to miners who are most often migrants for money. This has led to high rate of teenage pregnancy, temporary and unplanned marriages. When migrants miners leave after their operations, the affected women are left to their fate as they are unable to locate their whereabouts. Additionally, there is constant breakdown in marriages when miners who are mostly men leave to work elsewhere and engage in new relationships. An affected woman lamented *“He told me he has no wife not knowing he is married. I got impregnated for him and now he is gone not knowing where he is now. I have to cater for this innocent child all by myself with no job”*. Concomitantly, the harsh economic conditions coupled

with single parenting push children into child labour at the mines as illegal miners at the expense of their education. This has a long term impact on the human capital stock of the Municipality. There were therefore low levels of education among miners whose only survival strategy is found in small-scale gold mining.

## **5.4 Environmental Coping Strategies in the Tarkwa-Nsuaem Municipality**

### **5.4.1 Coping with Loss of Farmlands**

The taking over of farmlands by small-scale gold miners is a common shock and a major environmental problem in the Municipality. For farmers who have lost their farmlands, the study found that in as much as some were compensated, it was woefully inadequate. To cope therefore, some acquire alternative farmlands. However, these newly acquire farmlands are often further from farmers' communities and sometimes faced with unfavourable terms of land acquisition. To avoid this, most affected farmers resort to mining and/or lumbering either legal or illegal, which are equally most often environmentally destructive. The combination of these unsustainable alternative livelihood sources destroy land, forest cover and crop yields.

### **5.4.2 Coping with Water Pollution**

Small-scale gold mining has various impacts on water bodies including pollution, changing of water courses, increased sedimentation, discolouring and siltation thereby making them unpotable and unsafe for use. To cope therefore, people resort to the use of other sources of water either than rivers and streams. Since the coverage of pipe borne water is limited in the Municipality, people resort to use of boreholes and rain water for the fear of drinking contaminated rivers and streams. There are others who buy sachet water and patronise water tanker services. All these alternative sources add to the already high living conditions. Those with no alternative water sources than the affected sources fetch and either boil or allow it to

settle before use. There are others who notwithstanding and ignorant of negative effects, use the contaminated water sources with no safety precautions.

#### 5.4.3 Coping with Uncovered Pits

In coping with the numerous uncovered pits in the Municipality, the study revealed that there were no major and sustainable ways to cope with them. Some respondents retorted that they cover these pits with planks to conceal them. This they admit is dangerous when the boards get rotten and increases the degree of danger. It was therefore suggested that miners should be forced to reclaim the affected lands after their operations. It became evident that registered miners deposit some amount of money at the Ghana Chamber of Mines for covering pits left behind by mining companies. An appeal was therefore made to use the deposit for its purpose. Ironically, most of these pits are left by the illegal miners who make no deposit.

#### 5.4.4 Coping with Social-economic Impacts

Small-scale gold mining has led to high living cost in the Municipality. To cope with the high accommodation cost, those who can afford build their own houses. There are others who share single rooms with their families. Others also pool resources together to rent apartments and share. In coping with the high food prices, some resort to backyard gardening in addition to subsistence farming to supplement what is bought from the open market. Others also cope by buying from neighbouring districts where prices are relatively cheaper.

In coping with child labour and its associated absenteeism and school dropout, the TNMA through its Department of Social Welfare consistently does campaigns and announcements on child labour and its effects. Churches as well as other social organisations are also supported by the Municipal Assembly to that effect. School Management Committees and

Parent Teacher Associations are also motivated to encourage parents to take responsibility of the education of the children.

To cope with the health related problems, various coping strategies are adopted depending on the health issues in question. For instance, to cope with malaria, there are some who use insecticide treated mosquito nets while others use insecticides to kill mosquitoes in their rooms. Those affected by other health related problems resort to self-medication and/or visit nearby health related facilities for treatment. There are others who resort to the use of herbal/traditional medicine.

## **CHAPTER SIX**

### **SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSIONS**

#### **6.1 Introduction**

The study analysed the socio-environmental impacts of small-scale gold mining operations in the Tarkwa-Nsuaem Municipality in Ghana with the aim to suggest ways to make it sustainable. Accordingly, it analysed the operations, livelihoods and environmental impacts of small-scale gold mining as well as coping strategies adopted by people adversely affected by small-scale gold mining. The Chapter therefore presents the major findings from the study and the recommendations therefore.

#### **6.2 Summary of Major Findings**

The study revealed that small-scale gold miners use both underground and surface mining in extracting mineral ore. Majority of miners do not have valid mining licence and as such operate illegally. Interesting, both licensed and unlicensed small-scale miners operate in abandoned old mines belonging to GGL. The present methods used by the miners have not changed much from the past but the equipment used have significantly improved. While some miners use traditional methods by using simple tools like cutlasses, head pans, axes, pick axes and shovels others use mechanised methods through the use of hammer mills, excavators, drilling machines, generators, compressors, moist mechanisms, disc mills and pumps.

The study again revealed small-scale gold mining as a major livelihood source for most people especially the youth. People are attracted into and retained in small-scale mining due to its quick economic returns. Its most obvious contribution to development at the household level is related to household economic welfare. This household economic welfare benefits directly impact on total community development. The study revealed that some positive impacts of

small-scale gold mining are source of quick money, employment, local economic development in addition to its profitability over other economic activities.

Conversely, there is constant pressure on the socio-economic wellbeing, service provision, availability of housing and general infrastructure provision because of the concentration of small-scale gold mining in the Municipality. These are reflected in the Municipality's overall high standard of living: high food prices and high accommodation cost; child labour: school dropout and absenteeism and other vices such as drug abuse, teenage pregnancy and overall insecurity. Also, most diseases in the Municipality are mining related such as malaria, diarrhoea, skin diseases, acute mercury poisoning, upper respiratory tract infection, ulcer, kidney damage, silicosis and domestic accidents. Consequently, many interventions have been put in place to sustain livelihoods in the Municipality. These measures are championed by both governmental and NGOs. The study showed that the scale, scope and operation of these interventions present critical issues of sustainability.

Negatively, small-scale gold mining brings to bare environmental sustainability and sustainable development issues which are expected to maintain sound and regenerative natural environment that support livelihoods. Some evidences of the negative impacts of small-scale gold mining include uncovered pits, polluted lands by mercury and cyanide, destroyed farmlands, polluted air through blasting, polluted water bodies and prevalence of diseases. People hold the view that small-scale gold mining is unprofitable with degrading impacts on the environment and that nothing that destroys can be considered good or profitable. It is dirty, unprofitable and threatens the main physical capital stock such as farm lands and lands for other activities. Depending on the environmental impact, various coping strategies are adopted. Again, the sustainability of these measures is questionable.

From the foregone analysis, the working hypotheses hold true for the findings. The discussions from the findings revealed that measures are in place to make small-scale gold mining sustainable in the Tarkwa-Nsuaem Municipality. Also, small-scale gold mining contributes positively to people's livelihood but poses a lot of environmental problems in the Municipality. People affected by the operations of small-scale gold mining adopt various coping strategies for their survival. In as much as these working hypotheses hold true, the study again revealed that their sustainability is questionable and hence the following recommendations.

### **6.3 Recommendations**

#### **6.3.1 Decentralising the Acquisition of Valid Mining Licence**

The study revealed that perhaps the most obvious reason why most miners operate illegally is the fact that procedures for the acquisition of mining licence is bureaucratic, complex and cumbersome associated with inherent delays in the application process. This calls for the need to fast track the processes involved in acquiring mineral rights, renewal, transfer and mortgage of mineral rights. Building capacity of relevant state institutions at the local level to decentralize licensing procedures and its related issues in small-scale mining sector is necessary in promoting the overall legalization of the sector.

#### **6.3.2 Enforcing Compliance with Small-scale Mining Laws and Regulations**

Most small-scale gold mining operations in the Municipality are illegal. It is therefore important to strengthen the legal and regulatory framework for small-scale gold mining. Here, capacity building for the relevant institutions for carrying out their monitoring activities is critical. The Minerals Commission and the EPA especially should be well resourced and staffed to enable them enforce laws and regulations guiding small-scale gold mining operations. Well drawn out mine site plans should be developed for small-scale mining operations to ensure they

do not operate beyond approved boundaries. These plans should be subjected to regular reviews and approval by relevant state institutions.

Miners must be given clear precautionary measures/guidelines on how to conduct their operations to curtail their negative environmental and socio-economic impacts while maximizing small-scale gold mining benefits. There should also be regular Environmental Impact Assessment. The activities of small-scale gold miners should be effectively monitored by all stakeholders to ensure that their activities do not encroach upon water bodies and buffer lands.

### 6.3.3 Reclaiming Land

As with the large-scale gold mining companies, the reclamation bond agreement should be extended to small-scale gold mining to ensure that land reclamation is undertaken by small-scale mining companies/groups. Here, mining companies and groups should be bound to restore degraded lands to their original state when their operations are over. This can be done through tree planting and covering of dug-out pits. In addition to reducing the negative environmental and health impacts, land reclamation will ensure availability of land for agricultural purposes (mainstay in the Municipality). This will in the long run, reduce the overdependence of people on mining.

### 6.3.4 Providing Financial and Legal Support

In reducing the environmental impacts of small-scale gold mining, it is important for the state to consider given tax rebates to licensed small-scale gold mining companies who observe compliance and names of registered non-complying companies published and sanctioned. There is also the need for continual education on the laws and regulations guiding small-scale gold mining and the consequence for non-compliance. Subsequently, the government and financial institutions should consider given soft loans and/or micro credit facilities to registered small-

scale mining companies to improve and expand their operations. On the flip side, law enforcement agencies must be strengthened and motivated to help prosecute both legal and illegal small-scale mining companies which contribute to environmental degradation. In this regard, on the job training pertaining to best practices of small-scale mining is necessary.

#### 6.3.5 Ensuring Collaboration and Participation of All Stakeholders

The numerous laws and regulations guiding the operations of small-scale mining in Ghana seems a failure in lieu of the fact that illegal mining activities take place on any available gold bearing rocks. This situation, the study revealed is attributed to the formulation of laws and regulations at the national level with minimal and/or no local level involvement. The result is mistrust, conflict and constant tension between the locals who see the resource as a gift of nature and hence have automatic and uncontrolled right to exploit and law enforcement agencies. With due consideration to the highly localized nature of small-scale gold mining, local level participation in formulating laws and regulations should not be given to chance. Local level involvement in concession allocation, law enforcement and monitoring should be encouraged.

More importantly, the need for collaboration among relevant state institutions towards an integrated approach aimed at addressing the multidimensional challenges plaguing the small-scale gold mining sector is imperative. The formation of taskforce from the different small-scale mining related institutions and in accordance with the provisions in Ghana's Minerals and Mining Act, 2006 (Act 703) (establishment of Small-Scale Mining Committees) is necessary to effectively and efficiently monitor and regulate the sector to harness its potentials.

#### 6.3.6 Promoting the Establishment of Small and Medium Scale Enterprises

Miners reported that they reinvest their returns in other occupations including housing, trading and artisan to diversify their livelihood recognizing the eccentricity of their activity. This

desire for livelihood diversification should be supported with interventions in the form of capacity building to facilitate a diversified local economy that is well thriving. This calls for local economic development interventions to help individuals set up their own businesses with loans as well as providing training in business and financial management to local entrepreneurs.

#### 6.3.7 Providing Skills Development Programmes and Education

Most people, the youth especially engage in small-scale gold mining activities in the Municipality. This is because they lack the basic and requisite skills to gain employment in the formal and large-scale mining sectors. Efforts should therefore be intensified by the relevant institutions to organize vocational or skills development training programmes in the Municipality. Such programmes should aim at equipping the youth and others acquire the relevant and needed skills to be employable in various sectors of the municipal economy. Building the capacity of the locals in other employment sectors will promote livelihood diversification and sustainability and reduce the vulnerability and eccentricity of their activity.

#### 6.3.8 Environmental Awareness and Health Hazard Education

Sensitization on the environmental and health hazards of small-scale gold mining is needed to forestall environmental degradation and widespread environmental related diseases in the Municipality. Attention must particularly focus on pollution and its environmental and health hazards. Effective and regular education has the benefit of minimizing the adverse impacts of small-scale gold mining in the Municipality.

#### 6.3.9 Providing Commensurable Compensation Packages

People who have been affected by small-scale gold mining operations (mostly farmers losing their farmlands) must be given commensurable compensation packages. Valuation methods for compensation payment must not be left to arbitrariness but regularized to

commensurate with the actual cost of loss. Here, the involvement of relevant state intuitions (especially the Ghana Chamber of Mines and the Land Valuation Board) in ensuring justice and fairness is important to curtail the existing conflict between those affected and the miners over compensation payment. In the absence of a well-instituted compensation system, those affected must be allowed to negotiate for good value for their lost lands. Payments must not neither be delayed, partially honoured and/nor not at all paid to mitigate the livelihood loss.

### 3.3.10 Formation of Small-Scale Mining Associations

Encouraging small-scale gold miners to form associations that will seek their collective interest is important. Such associations should be encouraged to regularly interact with stakeholders in the sector to discuss issues such as streamlining their operations, application of appropriate technology, proper use and handling of chemicals and any other issues relating to their interest. Such associations in maximizing and sustaining the benefit of their operations will also seek to be watch committees against all forms of illegal small-scale gold mining operations to keep their name clean and positive in the eyes of the public.

## 6.4 Conclusion

Small-scale gold mining operations in the Tarkwa-Nsuaem Municipality is mostly done informally without any laid down regulations. Majority of miners operate with no licence and without any regard to the environment. Small scale-gold mining has caused environmental and its related problems in the Municipality. The irony here is that non-miners are mostly affected by these environmental impacts than the miners themselves. People who are affected by these impacts adopt various coping strategies though in most cases not successful and unsustainable.

Notwithstanding, its significantly contribution to peoples' livelihoods in the Municipality is unquestionable. Thus, small-scale gold mining has both positive and negative impacts in the

Tarkwa-Nsuaem Municipality. The study has however revealed that the negative impacts of small-scale gold mining operations far outweigh its benefits. It is therefore important now more than ever to regulate the activities of small-scale gold mining to make it sustainable and be able to harness its development prospects by putting in more efforts by all stakeholders especially the government.

**APPENDIX**

**Appendix I: Research Instruments**

**MASTER OF DEVELOPMENT POLICY  
KDI SCHOOL OF PUBLIC POLICY AND MANAGEMENT  
SOUTH KOREA**

*This Research Instrument is Designed to Collect Data for a Study on the Topic*

**The Socio-environmental Impacts of Small-scale Mining Operations in the Tarkwa-Nsuaem Municipality in Ghana**

**1. Questionnaire For: HOUSEHOLD HEADS**

**SOCIO-DEMOGRAPHIC PROFILE**

1. Age of respondent:  
a. - 19 [ ] b. 20 - 29 [ ] c.30 - 39 [ ] d.40 - 49 [ ] f.50 - 59 [ ] g.60+ [ ]
2. Sex of respondent (a) Male [ ] (b) Female [ ]
3. Educational status (a) Elementary [ ] (b) Secondary [ ] (c) Tertiary [ ] (d) No schooling [ ]  
(d)Other(s) (please specify).....
4. Number of dependents Biological children.....Relatives.....  
Other(s) (please specify).....
5. Occupation:  
Primary Occupation.....Secondary Occupation.....
6. What is your income per month?.....
7. How much do you earn from each occupation per month?  
Primary Occupation.....Secondary Occupation.....

**IMPACTS OF SMALL-SCALE GOLD MINING ON LIVELIHOODS**

Please indicate your agreement or otherwise to each of the under listed statements on a scale of 1 to 5 (1=Strongly Disagree; 2=Disagree; 3=Undecided; 4=Agree; and 5=Strongly Agree)

S/N	Statement	Scale				
		1	2	3	4	5
1.	Small-scale gold miners easily become rich					
2.	Small-scale gold mining creates employment					
3.	Small-scale mining leads to local economic development					
4.	Small-scale mining is profitable over other economic activities					
5.	Small-scale mining has improved compensation packages for those affected by it					

6. How do you consider small-scale gold mining as an economic activity? Please provide reason(s) your choice of answer.  
(a) Very bad (b) Good (c) Very good  
.....
7. In what ways have small-scale gold mining negatively affected your livelihoods?  
.....

8. How do you cope with such adverse effects of small-scale gold mining?  
 .....  
 9. Have you received compensation for any lose due to small-scale gold mining?  
 (a) Yes (b) No  
 If “Yes” please proceed to answer the following questions.  
 10. How adequate was the compensation relatively to your loss? Please provide reason(s) your choice of answer.  
 (a) Woefully Inadequate (b) Adequate (c) very Adequate  
 .....  
 11. Any Other Comment  
 .....

**IMPACTS OF MINING ON THE ENVIRONMENT AND HEALTH**

12. What environmental problems are associated with small-scale gold mining? Please list as many as you know of.  
 .....  
 13. How do you cope with these environmental problems?  
 .....  
 14. What health related problems are caused by small-scale gold mining in the Municipality?  
 .....  
 15. How do you cope with these health related problems?  
 .....  
 16. What should be done to minimise the adverse impacts of small-scale gold mining on the environment and people’s health?  
 .....  
 17. Any other comments  
 .....  
 .....

**2. Questionnaire for: SMALL-SCALE GOLD MINERS**

**SOCIO-DEMOGRAPHIC PROFILE**

1. Age of respondent:  
 a. - 19 [ ] b. 20 - 29 [ ] c.30 - 39 [ ] d.40 - 49 [ ] f.50 - 59 [ ] g.60+ [ ]  
 2. Sex of respondent (a) Male [ ] (b) Female [ ]  
 3. Educational status (a) Elementary [ ] (b) Secondary [ ] (c) Tertiary [ ] (d) No schooling [ ]  
 (d)Other (please specify).....  
 4. Number of dependents Biological children.....Relatives.....  
 Other(s) (please specify).....  
 5. Occupation:  
 Primary Occupation.....Secondary Occupation.....  
 6. What is your income per month?.....  
 7. How much do you earn from each occupation per month?  
 Primary Occupation.....Secondary Occupation.....

**SMALL-SCALE MINING OPERATIONS**

8. How did you get into small-scale gold mining?  
.....

9. For how long have you been into small-scale gold mining?  
.....

10. How did you acquire land/concession for small-scale gold mining?

(a) From large-scale mining companies [ ] (b) From Chiefs [ ] (c) From Family [ ] d.

Other(s) (please specify) .....

11. Do you compensate initial occupants of land after take over?

(a) Yes [ ] (b) No [ ]

12. If “Yes”, how is the compensation package determined?  
.....

13. If “No”, why?  
.....

14. Are you obliged to reclaim the land after mining?

(a)Yes (b) No

15. If “No”, do you have plans of reclaiming the land after your activities and why?  
.....

16. What chemicals do you use in your activities?  
.....

17. How harmful and these chemicals and how do you manage their usage?  
.....

18. Do you have a valid mining licence?

(a) Yes [ ] (b) No [ ]

12. If “No”, why?  
.....

19. If “Yes”, was it difficult obtaining it and from where? (Please explain your answer)  
.....

20. What method do you use for your mining operations?

(a) Surface Mining [ ] (b) Underground Mining [ ] (c) Both [ ]

21. How are your activities performed?  
.....

22. Do your activities threaten livelihoods and the environment? (Please explain your answer)  
.....

23. Has small-scale gold mining improved your socio-economic life and how?  
.....

24. Do you have alternative means of livelihoods?

(a) Yes (b) No

25. If “Yes”, what are these alternative means of livelihoods?  
.....

26. If “No”, are you ready to receive training in alternative means of livelihoods?

(a) Yes (b) No

27. If “Yes” in what areas and why?  
.....

28. How has small-scale gold mining impacted the development of mining communities in particular and the Municipality in general?  
.....

29. Please list some challenges of small-scale gold mining in the Municipality.  
.....

30. Any other comments  
.....  
.....  
.....

### **3. Interview Guide: COMMUNITY LEADERS**

1. What is your general impression of the small-scale gold mining sector in the Municipality?  
.....

2. What types of mining activities generally take place in the communities?  
.....

3. How do communities benefit from small-scale gold mining?  
.....

4. What roles do community leaders play in small-scale gold mining related issues?  
.....

5. How is the relationship between small-scale gold miners and the communities?  
.....

6. How has small-scale gold mining affected development, livelihood, environment and health?  
.....

7. What measures (and their effectiveness) are in place to manage the sector's impacts?  
.....

8. How do you assess the sustainability of small-scale gold mining in terms of its impacts on development, livelihood, environment and health?  
.....

9. Any other comments  
.....  
.....  
.....

### **4. Interview Guide: ENVIRONMENTAL PROTECTION AGENCY**

1. How long has the Agency been operational in the Municipality?  
.....

2. What are your major operational areas in relation to small-scale gold mining?  
.....

3. What are the major environmental problems in the Municipality?  
.....

4. How are these problems small-scale gold mining related?  
.....

5. How do you monitor the activities of small-scale gold miners?  
.....

6. How is the relationship between EPA, Minerals Commission and the Municipal Assembly?  
**Minerals Commission**

.....  
**Municipal Assembly**

7. What measures have been put in place to ensure the sustainability of the environment?  
.....

**5. Interview Guide: MINERALS COMMISSION**

1. How widespread is small-scale gold mining in the Municipality?  
.....

2. How extensive are both legal and illegal small-scale gold mining?  
.....

3. What proportion of small-scale miners are involved in both legal and illegal mining?  
.....

4. How are small-scale gold mining concessions acquired?  
.....

5. How is the relationship between Minerals Commission, EPA and the Municipal Assembly?  
**EPA**

.....  
**Municipal Assembly**

6. What are the impacts of small-scale gold mining on employment?  
.....

7. What are the impacts of small-scale gold mining on social life?  
.....

8. What measures have been put in place to monitor the activities of small-scale gold miners?  
.....

**6. Interview Guide: TARKWA-NSUAEM MUNICIPAL ASSEMBLY**

1. What are the main economic activities in the Municipality?  
.....

2. How does the Municipal Assembly relate with small-scale gold miners and vice versa?  
.....

3. How does the Municipal Assembly monitor the activities of small-scale gold miners?  
.....

4. What measures are in place to ensure that mining communities have sustained livelihoods?  
.....

5. How does small-scale gold mining contribute to development in the Municipality?  
.....

6. How do communities support or resist small-scale gold mining?  
.....

7. In case of resistance, how is it managed?  
.....

8. Have there been conflicts between mining communities and small-scale gold miners?

.....

9. If in the affirmative, how are they addressed?

.....

10. What are the major challenges of mining communities and how are they addressed or being addressed?

.....

11. Any other comments

.....

.....

.....

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