The Effects of Artisanal and Small-Scale Mining on the Development of Rural Communities

The case of Nangodi in the Upper East Region of Ghana

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Thesis presented to the Department of Sociology and Human Geography, University of Oslo, in partial fulfillment of the requirement for the award of Mphil in Development Geography

September 2010

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DEDICATION

To my son, **Nnaba**

ACKNOWLEDGEMENT

I am also grateful to my supervisor, Åase Lømo, her academic guidance, criticism, suggestions of new insights and unending support has been invaluable to this study.

ABSTRACT

Following major retrenchments in the large-scale mining sector, as a direct result of the mining sector reforms that the government of Ghana undertook under its structural adjustment programme, and years of economic hardships, the Artisanal and Small-Scale Mining (ASM) sector witnessed significant growth in the 1980s and 90s. The main objective of government and communities engaged in mining activities is to use the sector to generate employment and revenue to improve the living standards of the people in the mining areas specifically, and that of Ghanaians as a whole. Contrary to popular perception and the expectations of mining communities, these mining activities have often failed to bring about the much needed economic and social development.

The main objective of this study is to find out whether the mining communities have been able to benefit from ASM activities. This is to be achieved by examining the effects of the mining activities on such economic and social parameters as income levels, employment, agriculture (and other sectors of the rural economy), education, health, housing, migration and the local environment. The study used Nangodi, a small mining community in the Upper East Region of Ghana, as a case study. It hypothesized that the community has been negatively affected by the ASM activities. The study will test this proposition by analyzing data collected from the area and other secondary data.

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CHAPTER ONE
Introductory Chapter

1.0 General Introduction

The purpose of this study is to investigate the impact that Artisanal and Small-Scale mining (ASM) has on standards of living, and the economic and social development of rural communities where such mining activities take place. The study will specifically be examining ASM activities in Nangodi, Ghana, looking at the effects such activities has had on the lives of the people of the area and the economic and social development of the entire society. The study will be looking at the effects of the mining activities on such economic and social parameters as income, employment, education, health, education, and housing as well on other economic activities in the Nangodi community.

This first chapter offers a general introduction to the study. It will begin with a brief introduction to the country; Ghana, and mining in the country. It will then proceed to define the problem statement, aims and objectives of the study and the hypothesis of the study. This chapter also presents a brief background to the study area; Nangodi, looking at its physical, economic and other (geological) characteristics.

1.1 The Country: Ghana

Present day Ghana was the first place in Sub-Saharan Africa that European traders and explorers arrived to trade first in gold and later in slaves. Due to the unusual large quantity of gold the Europeans found in the country, they named it the Gold Coast. This name remained till the country gained independence in 1957 and was renamed Ghana (after the ancient Ghana empire which existed between c. 400 -1235 A.D. in what is today Southeastern Mauritania, and Western Mali). Ghana is blessed with a fair amount of natural resources, with gold as its highest foreign exchange earner. The country is bordered to the east by Togo, to the north by Burkina Faso, to the West by Cote D' Voire and to the South by the Gulf of Guinea. It has a population of 23.9 million (UN 2008) and a land area of 238,573 sq/km.

Besides gold, cocoa, timber, tuna, bauxite, aluminum, manganese ore, diamonds, are Ghana's other main exports. Ghana is the world's second-largest producer of cocoa. Ghanaian cocoa beans are renowned for their quality and depth of flavour[1]. The beans are grown on small, family owned farms in the forest region of Ghana and are popular with European and American chocolate factories and confectioneries. In spite of the important position Ghana enjoys as a leading producer of quality cocoa beans, coupled with the importance of the beans to the Ghanaian market, cocoa farmers in the country have benefited very little from their product. The inability of successive governments to process the cocoa beans has made both the national economy and farmers very vulnerable to unstable world market prices. In addition government frequently acquires the beans for much less than they are priced on the world market. The continued reliance of the Ghanaian economy on cocoa beans and other primary products has also made it very susceptible to fluctuations of their prices on the world market.

Despite her rich mineral and other resources, Ghana's GNI per capita stands at a mere US$590 (World Bank 2007) which is hardly any improvement from that at independence. Corruption, mismanagement and the continued reliance on (unprocessed) primary produce are some of the factors that are said to have accounted for the inability of subsequent governments to improve the standard of living of Ghanaians. After many years of heavily borrowing to support its budget deficits, Ghana joined the Heavily Indebted Poor Countries (HIPC) initiative of the IMF and the World Bank in the year 2000. Ghana is expected to enjoy some US$3.5 billion of total debt relief under the Initiative (The World Bank)[2].

In June 2007, the discovery of major offshore oil reserves was made in Ghana, encouraging expectations of a major economic boost. Oil is however, not expected to flow for some years. If however the record of African countries with vast oil reserves, and Ghana's own, with other natural resource wealth are anything to go by, the expectations raised by these new discoveries in the country have to be tampered with caution.

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[1] Philip Keenan and Jane O'Connor (1996) (http://www.globalgourmet.com/destinations/westafrica/omanhene.html)

[2] http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/GHANAEXTN/0,,contentMDK:20225788~menuPK:351972~pagePK:141137~piPK:141127~theSitePK:351952,00.html

1.2 Mining in Ghana

Ghana is an important producer and exporter of minerals. The country placed third in a comparative geological ranking of African countries, coming behind only South Africa and Zimbabwe (Akabzaa and Darimani 2001), and is the continent's second largest producer of gold (Balfors et al. 2007). The country however falls short of being considered a mineral economy by the UN definition; "those generating at least 10 percent of Gross Domestic Product from mining and at least 40 percent of their foreign exchange earnings from mineral exports" (Untied Nations 1982, quoted in Aryee 2001: 61).

Minerals mined in the country include gold, diamond, bauxite, manganese and lime stones among others. Gold is by far the most important mineral to the economy, contributing some 90% of mineral export (SAPRIN 2002 cited in Singh et al) and some 40% of the total export earnings (Tschakrt and Singha 2007). The mining sector is thus well positioned to play an important role in the economic and social development of the country, and though it has made a modest contribution in that regard, there remains much that it could still do.

After independence in 1957, Ghana's mining sector was beset, for a long time by a myriad of problems stemming from the economic, financial, institutional and legal framework within which the sector operated (Jonah 1987, Aryee 2001). The socialist policy of the Nkrumah administration[3] of nationalizing minerals resources in the county also meant that there was little incentive for private investments in the sector (Akabzaa and Darimani 2001). These and other problems discouraged investments from sector investors and other prospective investors. As a result, the country's mining sector remained largely undeveloped and underutilized.

Following years of economic stagnation and hardships in the 1980s, the Ghanaian government decided to go with the recommendations of the World Bank to embark on economic reforms; the Structural Adjustment Programmes (SAP). A review of the country's mining laws was a central component of these reforms. SAP was driven by the development paradigm which emphasized private sector-led development as the engine of economic recovery for developing countries (Akabzaa and Darimani 2001). In these

[3] The first post-colonial government in the country

economic reforms, developing countries with important resource sectors were required to shift their policy emphasis from the control of such resources towards a primary objective of maximizing tax revenue over the long term. This was to be achieved by a new division of labour where governments were to focus on industry regulation and promotion while private companies (mostly foreign owned) take the lead role in the operation, management and ownership of resource enterprises.

The government of Ghana launched this Economic Recovery Programme in 1983, and the mining sector received priority attention, as reform of the sector was seen as key to the country's economic recovery. The reforms in the mining sector involved significant institutional changes and policy changes, from the establishment of the Minerals Commission in 1984, and the promulgation of the Minerals and Mining Code to the promulgation of the Small-Scale Mining Law in 1989[4] and the establishment of the Environmental Protection Agency in 1994. The rationale for these reforms was to reduce risk for investors, streamline the processes involved in obtaining mining permits and concessions and to protect investors from government interference. Following the implementation of these economic reforms, the country's mining sector, especially gold, witnessed a significant investment boom and increased production. Over the ensuring two decades, Ghana's gold production increased tremendously with its attendant revenue for the government (Akabzaa and Darimani 2001, Amoah 2003). This is reflected by the increasing number of large-scale mining companies and exploratory companies in the country.

As at the end of 1999, the mining sector in Ghana had attracted over US$3 billion worth of foreign direct investment (Akabzaa and Darimani 2001). There are 19 major operating mines and over 128 local and foreign companies with exploration licenses. The sector accounts for over 30 percent of gross foreign exchange earnings. The mining sector has also attracted a considerable number of sector support companies such as catering and transport companies, explosive manufacturers, mineral assay laboratories among others.

In spite of the resultant boom in mining sector activities, there is growing concern as regards to the real impact the growth of these activities have had on the lives of

[4] See appendix Two.

ordinary Ghanaians living in mining communities and the country as a whole. It has been asserted by many a writer that reforms of the mining sector in Ghana under SAP has generated considerable social cost and had considerable negative impacts in mining areas (Akabzaa 2000, Akabzaa and Darimani 2001, Amoah 2003). It is argued that many local communities have been displaced, their farming based rural economies disrupted and the local environment destructed. On the national scale, it has been suggested that the Ghanaian economy earns only a mere 5% of the total mineral export value, $46.2 million out of a staggering $893. 6 million in 2003 (Kwai Pun 2007).

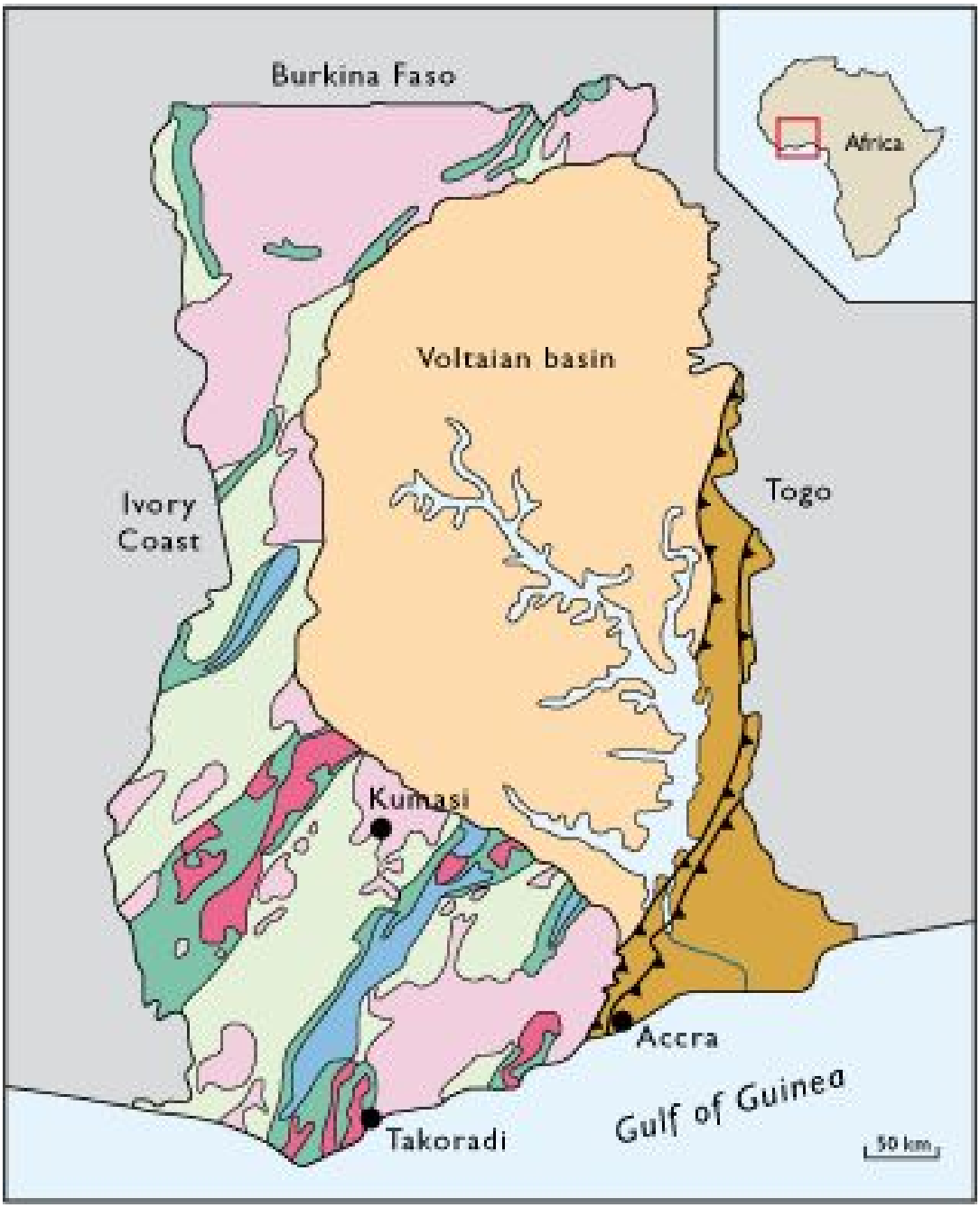

Figure 1.1 Geological Map of Ghana

Source: Mining Portal of Ghana

(http://www.ghana-mining.org/ghweb/en/home.html)

1.3 Background to the Study and Problem Statement

Nangodi, the area that will be the site for this research, has long been known to possess some deposits of gold. As early as 1933, some exploratory work was carried out by McGuiness and Ried in Nangodi, and this led to the discovery of gold deposits in the area (Atebiya 1997). From 1934 to 1939, 28 000 fine ounces of gold was produced from the prospects and mines in the Nangodi belt. Mining in the area however stopped in the late 1930s when it was decided that it was no longer economically viable to mine the remaining deposits. In the early 1990s however, thousands of mine workers laid off from the country's main mines, as a direct result of the reforms that the government undertook under SAP were forced to move to abandoned mine sites to prospect and engage in small-scale and illegal mining activities on individual and small group basis[5]. Nangodi was a recipient of several of such retrenched miners.

This reemergence of mining activities in the area was greeted with great enthusiasm by the people of the area. The expectation being that the mining activities would serve as an alternative source of livelihood to the indigenes of the area and help to stimulate other economic activities. Artisanal and small-scale mining (ASM) are the main types of mining in the area, that is mining in Nangodi is limited to individuals or families making use of manual techniques (artisanal) and small groups of people using some limited form of mechanization (small-scale) in the mining process.[6]

Wherever mining is practiced, whether on a large-scale or a small-scale, it brings numerous economic gains as increased employment and higher income levels to the people of the area concerned, and major fiscal benefits to the government with the potential to stimulate the national economy (Hangi 1996). As stated earlier, the mineral industry in Ghana constitutes an important sector by providing revenues, employment, foreign exchange and raw materials for local industries. Mining has also been shown to have the potential to improve the social lives of people, in terms of their education, telecommunication, transportation, gender equality and basic infrastructure (Eggert 2001).

[5] Thousands of workers were laid off from the mining companies when government handed control to private ownership.

[6] See some more elaborate attempts at presenting the meanings and difference between artisanal and small-scale mining under Artisanal and Small-Scale Mining in the next chapter.

In view of the above benefits associated with mining activities, the discovery of gold deposits at Nangodi was greeted with great joy and expectation because it was naturally assumed that the aforementioned benefits will be brought to bear on the lives of the indigenes of the area and hence improve their standard of living. Several years on, questions have arisen as to the exact nature of the impact the mining activities in the area has had on livelihoods, and economic and social development as a whole. This study will therefore attempt to answer the above questions by examining the nature of effects the mining activities have had on livelihoods of the indigenes of the community.

1.4 Objectives

Primary objective: to examine the extent to which ASM in Nangodi has affected the lives of the people of the area, and the economic and social development of the entire community. The specific objectives will include examining:

- The effects of the mining activities on such economic and social parameters as income levels, employment, education, health, and housing.
- The effects of the mining activities on the other sectors of the rural economy, particularly agriculture.
- The level of participation by indigenes of the area in the mining activities
- The levels of participation of men and women in the mining activities
- The extent to which the mining has affected the local environment

1.5 Background to the study area

1.5.1The Physical Environment

The topography of the area is dominated by relatively undulating lowlands, gentle slopes ranging from 1% to 5% gradient with some isolated rock out crops and some uplands slopes. It falls within the Birimian, Tarkwaian and Voltarian rocks of Ghana. The area is drained mainly by the Red and White Volta and their tributaries (MTDP 2006-2009)[7].

The climate is classified as tropical, and has two distinct seasons, a wet rainy season, which is erratic, and runs from May to October, and a long dry season that

[7] 1st Medium Term Development Plan for Tallensi-Nabdam District Assembly 2006-2009

stretches from October to April with hardly any rains. The mean rainfall ranges between 88mm-110mm with an annual rainfall of 950mm. The area experiences a maximum temperature of 45 degrees Celsius in March and April and a minimum of 12 degrees in December. The vegetation is guinea savannah woodland consisting of short widely spread deciduous trees and a ground flora of grass, which get burnt by fire or the scorchy sun during the long dry season. The most common economic trees are the sheanuts, dawadawa, baobab and acacia.

The major winds in the area are the Northeasterly Trade Winds (commonly referred to as the Harmattan) and the Southwest Monsoons. Whilst the Harmattan is dry and carries with it a lot of dust particles, the Southwest Monsoons are heavy laden with moisture, bringing with it rainfall. These two winds alternate between the two seasons.

Geologically, the area has high mineral potential. There are several granitic, birrimain, voltarian rocks mixed with alluvial soils. The soils generally have low organic matter content, as a result of continuous cropping and overgrazing over several centuries. High temperatures and sparse vegetative cover combine to promote leaching of the top soils further compounding the inability if the soils to support plant life.

1.5.2 Location and size

Nangodi is a small community which forms part of the newly created Talensi-Nabdam District[8], carved out from the Bolgatanga District Assembly in the Upper East Region of Ghana. Nangodi is located about 22.4km North East of Bolgatanga, the regional capital. It lies along the road running from Bolgatanga to Bawku, a border and commercial municipality in the Upper East Region. Nangodi is thus well served by the asphalt road linking the two important townships.

Below is a map Ghana showing the location of Nangodi between the Bolgatanga and Bawku East Municipalities.

[8] One of the 27 new districts created in 2007

Figure 1.2: Location of the study area on the map of Ghana.

Source: Based on www.ghana.gov.gh

1.5.3 Economic Characteristics

The population which is predominantly rural depends on the forest reserves for their livelihood. They depend on it for both their domestic and commercial needs. Small timber poles and rafters from the forest are used for building houses and are also sources of traditional energy (mostly used as firewood for cooking) among others. Also forest products such as fuel wood and charcoal are an important source of income for many people. The increases in the cost of liquefied petroleum gas (LPG) and electricity tariffs resulting in the increasing use of firewood and charcoal in urban areas has made their export from rural areas such as Nangodi a very lucrative enterprise.

Farming is the predominant economic activity in the area, and was until the recent introduction of Artisanal and Small-Scale mining activities, the main source of livelihood for the majority of the inhabitants of the area. Farming in the area is on a subsistence basis that is mainly to meet family food needs and to have a small quantity left for sale in order to purchase other provisions for the family[9]. As in most parts of Northern Ghana, farming here takes two forms, the cultivation of crops and the rearing of farm animals and birds. Crops cultivated include cereals as millet, guinea corn and legumes as groundnuts, beans and also vegetables. Farm animals reared include cattle, goats and sheep.

1.6 Organization of the Study

For purposes of analysis and easy comprehension of issues, this study would be divided into five chapters. Each chapter will deal with a series of relevant themes. Chapter one offers a general introduction to the study. It has provided information on the main themes of the study and justification for the research problem. The chapter also looked at the aims and objectives of the study. Chapter one also presented a brief background to the study area, looking at its physical, economic and geological characteristics.

Chapter two will take a look at the theoretical themes relevant to the study. It will initially provide the main tenants for the 'resource curse' and 'sustainable development' theories, reviewing the arguments informing these theories and the

[9] People engaged in farming in Nangodi will be called small-farmers in this study to differentiate them from farmers who may be construed to mean people engaged in commercial farming.

criticisms that have been raised against them. The implications of these theories for the mining industry and communities are also discussed.

The third chapter will focus on the methodological discussion of the study. It will discuss and justify the choice of methodology employed and describe the sources of data, data collection techniques, methods of data presentation and analysis and finally outline the challenges encountered on the field.

The fourth chapter will be used for the presentation of empirical data. It will briefly touch on the demographics of the respondents and discuss the effect of the ASM activities in Nangodi on the lives of the people and on the area's economic and social development. The chapter will focus on analysis of the empirical data. It will attempt a detailed account of the effects ASM activities on such economic and social parameters as income levels, employment, education, health, migration, gender relations and housing in the area.

The final chapter will make a summary of the research findings and present the conclusions of the study.

CHAPTER TWO

Theoretical and Conceptual Framework

2.0 Introduction

This chapter explores theoretical and conceptual framework that are relevant to this study. Such theories as the resource curse thesis and sustainable development are discussed. The chapter also takes a look at large-scale and small-scale mining, zeroing down on artisanal and small-scale mining. It is subdivided into various sections and presented with the research questions and objectives of this research in mind. It begins by taking a look at some commonly used terminologies of mining.

2.1 Definition of Terminologies/Features and Definition of Small-Scale Mining

Mining may be defined as the excavation of the earth crust for minerals; economic or non-economic minerals. Mining covers the mining of precious and industrial minerals, quarrying, gravel and sand winning. In Ghana, mining is defined to include any activities relating to the extraction of "any substance in solid or liquid form, occurring naturally in or on the earth, or on or under the seabed, formed by or subject to geological process including building and industrial minerals but does not include petroleum or water" (Ghana's Minerals and Mining Law, PNDCL 153 cited in Aryee 2001: 1).

Mining has been classified using different criteria; one such classification is based on the mode of extracting the ore. Here we have underground, surface mining and dredging. Underground mining is undertaken when the ore is located under the surface of the earth. Surface mining is undertaken when the ore is found on the surface, and dredging is undertaken when the ore is located under a riverbed.

Mining is also classified based on its legality, so that it is considered as legal and illegal mining. Legal mining is that type of mining in which the mining persons or body has been registered according to the relevant legislation and granted a concession. Under this type, we may have large-scale, medium-scale and small-scale mining. Illegal mining is that type which lacks any concession.

Small-scale mining, which is the main interest of this study, also has two distinguishable components, although the line of demarcation between them is not always clear. According to the United Nations Report on small-scale mining in the developing

countries (1972), the first of these is referred to as artisanal mining, the basic concept being the direct application of human energy directly with limited or no mechanical assistance. This applies as much to one man panning gold as it does to an organized group in which each member is assigned a specific task such as digging, sorting or carrying ore.

The second component of small-scale mining, involves the application of modern concepts, techniques and technology to the production of minerals on a limited scale of output. The first component-artisanal small-scale mining- is basically the type of mining that is undertaken in many African communities where the mineral deposits are not great enough to attract multinational and transitional or national (government) mining companies. Such is clearly the case of Nangodi; a small community- in the Upper East Region of Ghana.

2.2 Large-Scale verses Small-Scale Mining

In terms of scale, mining is generally considered in two categories - Large-scale and small-scale mining. Large-scale mining is the kind usually undertaken by large companies (national or multinational), employing a large labour force and also involves the use of huge bulldozers and excavators to extract the metals and minerals from the soil. The companies normally operate at large sites and continue their operations until it is no longer economically viable to mine the remaining mineral deposits. One example of a large scale mine, often cited, is the Serra Pelada mine in Brazil which yielded 29,000 tons of gold from 1980 to 1986 and employed 50,000 workers. Rio Tinto is a classic example of a large-scale mining company, with several mining operations around the world.

In contrast, small-scale mining is often undertaken by a relatively small group of people. They prospect together and identify sites they think will yield gold or any other valuable metals or minerals. The term small-scale mining is generally used to refer to the type of mining undertaken by individuals, groups or cooperatives with limited or no mechanization (Hentschel et al 2002). The number of people employed and the level of mechanization are therefore important in terming the scale of the mining operation.

In spite of the fact that large-scale mining companies employ more labour, they tend to make use of less local people and supplies (Lanning and Mueller 1979). This is

mainly because these companies normally require specific skills which the local people in most cases do not have. The large-scale mining companies therefore often rely on skilled expatriate workers. In addition, being capital-intensive, it has to import most of its required equipments from abroad. Large-scale mining thus tends to have less direct impact on the local economy than small-scale mining, since the latter employs it's labour from among the locals and relies more on the local economy for its supplies.

The nature of the mining concession granted also differs from large-scale to small-scale mining operations. In most instances, large-scale mining operations are granted large mining concessions (that is over large tracts of land), over a longer period of time; possibly till the mineral deposits has been exhausted. Small-scale mining operations by contrast, when they have a concession, tend to have small and limited concessions. In many countries however, small-scale mining is part of the informal sector, this means that among other things they operate without a valid concession (Hentschel et al. 2002).

Reasons accounting for the above situation include the lack of knowledge of the legal requirements; local traditional and cultural behaviours; little incentives to operate legally; demanding bureaucratic procedures to gain and remain legally recognized; and limited danger of sanctions in comparison to the possibilities to evade the law. In addition the governments of many developing countries do not have the requisite capacity to monitor the compliance of the many small-scale operators and therefore are reluctant to commit themselves by regularizing their activities. Extending legal recognition to ASM operators will not only bolster government revenue through taxation, but will offer the miners the opportunity to acquire relevant knowledge about more efficient, safer and environmentally friendly techniques.

Large-scale mining and small-scale mining operations are also known to affect the environment at different rates. Most researchers believe that small scale mining is more harmful to the environment and causes more social problems than large-scale mining. Small-scale mining operations are mostly associated with high environmental cost, and poor health and safety records. Small-scale mining is more costly in environmental terms per unit of output as compared to medium and large-scale mining operations. The sector is therefore viewed by many people as 'dirty and fundamentally unsustainable'

(Hentschel el al. 2002, Akabzaa and Darimani 2001, Akabzaa 2000). This has a lot to do with the fact that the sector is mostly part of the informal sector and is therefore outside the regulatory framework of governments. In addition small-scale mining operators tend to lack basic awareness and knowledge of better methods to reduce the impacts of their activities on the environment. Such operators also often lack incentives to operate in a more environmentally friendly manner since their activities are mainly for subsistence and is intended to meet immediate needs. There is thus less focus on the long term sustainability and consequences of their activities.

It must however be stated that most of the environmental effects associated with small-scale mining are also common with large-scale mining operations, especially in places where such operators are less environmentally conscious or the government regulatory framework is weak and ineffective. In such instances, it is not uncommon to find the mining companies coming into conflict with the local population. The much publicized case of Shell in the Niger Delta of Nigeria is one case that readily comes to mind[10]. The recent oil spillage in the Gulf of Mexico and the subsequent fallout between the US government and BP also shows that the environment is at much risk from the activities of large-scale mining companies as it is from small-scale miners. In comparison however, large-scale mining firms are more likely to operate according to laid down environmental guidelines and are required to make efforts to mitigate the social and environmental cost of their activities to both the local population and environment.

The mining sector is also characterized by conflicts between the large-scale and small-scale sectors. In many developing countries, where large-scale and small-scale mining take place side by side, there is always the danger of conflict between their respective practitioners. According to Hilson and Yakovleva (2007), many African governments, under economic reform, promoted large-scale mineral exploration and mining activity. This policy has resulted in the influx of predominantly foreign parties which has caused widespread community dislocation and disillusion. This has left many local miners to operate illegally, leading to big backlashes and occasionally, violent conflicts. Illegal 'local' small-scale operators may encroach on mining concessions

[10] http://news.bbc.co.uk/2/hi/africa/8090493.stm

awarded to large 'foreign' mining corporations. These 'illegal' miners have often argued that there exist few alternative sources of livelihood.

2.2.1 Artisanal and Small-Scale Mining

The terms artisanal and small-scale mining have often been used to describe the type of mining undertaken by individuals, groups or cooperatives with limited or no mechanization (Hentschel et al 2002). The terms are mostly used interchangeably, though attempts are made in some quarters to differentiate them. Attempts to differentiate artisanal from small-scale mining have used the availability of an established fixed installation and the level of mechanization and organization to differentiate the two terms. The MMSD Final Report (2002) for instance, argues that artisanal mining involves only individuals and families and is purely manual. Whereas small-scale mining involves an organized group of individuals using mechanised instruments to an appreciable extent. In this project I will make no attempt to differentiate the two terms, and will therefore use them together and interchangeably.

Several views have been put forward to explain why people engage in ASM activities. In the 1970s and 80s, it was argued that ASM is undertaken by self-motivated entrepreneurs and business people who are mainly interested in making a quick profit (Hilson 2009). This view was first echoed in a United Nations publication; 'Small-Scale Mining in the Developing Countries (UN 1972) and was reaffirmed at such international workshops as 'The Future of Small-Scale Mining held in Jurica, Mexico, 1978 and the Seminar Strategies for Small-Scale Mining and Mineral Industries in Mombasa, Kenya. Later, it was recognized that ASM is used as a survival strategy by people faced with hardships, mainly the rural poor. This latter view was first adopted in May, 1995, at a Roundtable on Informal Mining in Washington. This change in perception was influenced to a large extent by the rapid expansion of the sector in developing countries, particularly in Sub-Saharan Africa to provide employment and incomes to vulnerable groups, including women and children (Hilson and Banchirigah 2009 cited in Hilson 2009). In Ghana for instance, Hilson and Banchirigah have argued that about a million people (about 5% of the national population) were employed by the sector at the time. Others have further argued that, though the ASM sector is poverty- driven, the poor are

often used by affluent and influential people outside the actual mining areas, and it is these who are the actual beneficiaries of the mining operations, and not the rural poor (Smit 2007 cited in Tschakert 2009).

The ASM sector produces a broad range of minerals. Gold mining however seems to be the most popular in most countries. In Peru, gold mining is the main interest of almost all ASM operators. In the Philippines the figure stand at about 90%, where as in Ghana and Ecuador two-thirds of the labour force in the sector are involved in gold mining (Hentschel et al. 2002). Alluvial gold mining and mercury amalgamation are common activities within the sector. Some other minerals produced by the ASM sector include bauxite, iron ore, diamonds, marble, limestone, different germ stones and other construction materials The sector's over all contribution to global minerals production is very significant. The ILO claims that the sector accounts for between 15% to 20% of the world's non-fuel mineral production in recent time (Hentschel et al. 2002). Though at the individual level, outputs are not so impressive, the large numbers of people involved in the sector means that together on a national scale or globally levels of production are quite significant for total outputs from the mining sector.

2.3 ''The Generation of Theory' (Grounded Theory)

Grounded theory is to be used in the collection and analysis of data in this study. Grounded theory has been defined as "theory …derived from data, systematically gathered and analyzed through the research process. In this method data collection, analysis, and eventual theory stand in close relationship to one another" (Strauss and Corbin, 1998 quoted in Bryman, 2008: 541). Grounded theory is concerned mainly with the generation of theory from data collected in the research process and is iterative, meaning that data collection, data analysis and theory formulation proceed concurrently, repeatedly referring back to each other.

Grounded theory requires that, social researchers suspend their awareness of relevant theories or concepts until a later stage in the research process (Bryman, 2008). The assumption that it is possible to do the above has raised the most significant criticism against grounded theory. In recent times, it is widely accepted that theory-neutral observation is not feasible. In formulating the proposal for this research, the 'resource

curse thesis' and the theory of sustainable development were two theories that were considered to be relevant for this study. The two theories were therefore adopted, and are discussed and explored in relation to the role ASM in rural development from the data collected. By collecting and analyzing data on the subject, and referring back to the theories already adopted, attempts have been made to explore some new dimensions to these theories by looking at the relationships between these and natural resources in rural areas.

2.4 Resource Curse Thesis

The question of the influence of natural resources on economic development is one that has intrigued many scholars, and has figured prominently in economic, and even political, debates in the past fifty years. Countries blessed with bountiful natural resources are often expected to benefit from such endowments. This is because popular opinion seems to sway towards the view that natural resources are important in the development process. Some objections have however been raised against this view, with some skeptics arguing that most resource rich economies (mostly mineral wealth) are unable to benefit from their natural resource endowments. This is a paradox because exploiting natural resources is expected to generate employment, income (especially foreign exchange) and should thus lead to greater domestic saving, investment and increased (local) development and improved livelihoods.

Since the 1980s, a flood of new studies have found that countries with abundant natural resources grow more slowly than those without. It is this phenomenon that has been called the 'resource curse'. This phenomenon has also been referred to by several other names as the 'Great paradox of development', 'King Midas' problem' (Auty 1993, Ulrich 2007), or the 'Dutch Disease' (a term coined by the Economist in 1977). These new studies have sought to examine the inverse relationship between natural resource endowment and development that is why societies with these natural resources are unable to benefit from such endowments.

Natural resources are exploited to generate income (and foreign exchange), employment and to stimulate local industry, but these new studies have argued that most resource rich economies, especially in the developing countries of Africa, Latin America

and Asia have not been able to benefit from their favourable endowments. Sachs, Warner and Gylfason through some elaborate research have concluded that there is a negative correlation between natural resource endowment and economic development (cited in Kajaneder 2007). Auty (1993) has also found growing evidence to show that natural resources can distort a country's economy to such as extent that it actually becomes a curse. This phenomenon of 'resource curse' goes back a long way in economic history and has for a long time been a major theme in policy discussions. Jeffrey Sachs and Andrew Warner for instance have agued that as far back as the 17th century, the Netherlands out-performed Spain economically, despite the latter's more favourable natural resource endowment (cited in Angius).

2.4.1 What Causes this Phenomenon (Resource Curse)?

Several theories have been put forward in an attempt to account for the 'resource curse thesis'. Hausmann and Rigobon (2002) identifies three such theories; the notion of the Dutch Disease, the rent-seeking activities generated around the presence of the associated tax revenues from the natural resource concerned, and the third theory concerns the damaging effects of volatility.

Proponents of the Dutch Disease approach argue that an increase in revenue realized from the exploitation and sale of natural resources would stimulate a greater capacity to import 'tradables'. In addition, there would also be an increased demand for all goods including non-tradables, some of which can not be imported and would have to be produced locally. The economy concerned would therefore be required to shift resources from the non-resource tradable sector (manufacturing), so as to expand the production of non-tradabels as construction and services. The resource boom would as a function lead to a contraction in manufacturing. Ulrich (2007), attempts to explain the Dutch Disease by concentrating on the effects of the influx of foreign exchange. For him, the massive influx of foreign exchange which results from the export of these resources puts pressure on exchange rate and the domestic currency. The domestic currency appreciates as a result. This negatively affects other sectors of the economy, lowing returns on investments in such sectors. This triggers inflation meaning that the economy concern is unable to live up to its potential.

The Dutch Disease approach though intriguing, does not fully explain why resource-rich economies record lesser growth rates than their less-endowed neighbours. The theory only concludes that booms in the resource sector would lead to a contraction in manufacturing, not in over all growth. This does not implicitly imply that an economy would grow more slowly, simply because it has a booming natural resource sector.

Some writers have tried to explain away criticism to the Dutch Disease approach by assuming that non-resource tradables play a special role in the growth process. Matsuyama for instance assumes that there are increasing returns to scale in manufacturing, but not in the resource sector (1992 cited in Huasmann and Rigobon 2002). A booming resource sector will therefore result in the economy specializing in the less dynamic sector. This latter attempt also comes short when one considers the available empirical data for resource-rich economies. Going by Matsuyama's assumptions and explanation, one will expect resource dependent economies to perform poorly when prices for their resources are highest, and improve when prices fall. Using data from the World Penn Tables between 1960 and 1980, Huasmann and Rigobon (2002) find that oil-dependent economies grew fastest in the period of rising prices and collapsed when oil revenues and volumes declined after 1980.

The 'rent-seeking approach try to account for the resource curse by asserting that resource wealth makes economies less entrepreneurial. The argument here is that the abundant natural resources results in so much wealth floating around that there is less incentive for entrepreneurial persons to engage in productive activities as compared to unproductive rent-seeking activities. This discourages the creation of new wealth. Corruption is a factor cited in much the literature. The availability of natural resources leads to increased rent-seeking and corruption by government officials and the elite. The short-run availability of financial assets increases the opportunity for theft by those charged with dispensing such assets. Former Nigerian military dictator, Sanni Abacha is said to have made away with some 3 billion US dollars (Ayittey 2006 cited in Humphreys et al 2007). This attempt also fails to explain why oil-rich economies for instance, do better in times of rising prices and not so well when prices slump.

Others proponents of the rent-seeking approach argue that resource-rich developing countries fail to develop the political compact that allows them to tax their

citizens, because they have revenues from natural resources to rely on. Auty (1995), for instance has suggested that a favorable resource endowment may lead to tolerance of weak macroeconomic policies. In addition, resource-rich developing countries tend to place less emphasis on developing other sectors of their economies. The above make such countries prone to macroeconomic crises whenever there a significant shortfall in resource revenues.

The third explanation on the curse centers on volatility. It is argued here that volatility is bad for growth, for investment, for income distribution, for poverty alleviation and for educational attainments. Huasmann and Rigobon (2002; 9), asserts that "natural resource rents tend to be very volatile because the supply of natural resources exhibit low price-elasticities of supply". Economies heavily dependent on natural resources are therefore more prone to shocks. They have put the standard deviation of oil prices for instance, at about 30 to 35 percent per year. For a country where oil represents about 20 percent of GDP, a one standard deviation shock to the price of oil represents an income shock equivalent to 6 percent of GDP.

Another school of thought that have tried to account for the resource curse is the 'greed theorists', who ague that the availability of natural resources can play an important role in making countries vulnerable to civil conflicts, which then prevents the countries concerned from realizing their full potential. Proponents of this 'greed school of thought' argue that where the opportunity cost for appropriation is lower than that for production, people as rational economic players will chose violence to compete for an economic advantage (Cramer 2002). Proponents of this view claim that the civil wars in such countries like Sierra Leone and Angola, had a lot to do with the control of diamonds, while that in the Democratic Republic of Congo is said to center on the control of the several minerals riches and other natural resources in that country. Parties in these conflicts are thought to be rational economic players driven by the urge to maximize power in order to have access to the wealth generated by these resources. (Collier 2000, De Soysa 2000). The ensuing violence/conflicts then act as a barrier to the development of the economies concerned.

Others have also cited such factors as the colonial legacy of inadequate education and infrastructure to support the extraction of these resources and unfavorable world

dynamics for the disappointing economic performance of most of these resource rich countries (Rodney 1972). In many Sub-Saharan African countries, infrastructure that aided the colonel powers to exploit natural resources, were about the only infrastructure inherited from the colonel legacy.

2.4.2 Critique of the 'Resource Curse Thesis'

Being in direct contraction to economic theory and popular opinion, the resource cures thesis has met fierce criticism from various quarters. Proponents of the resource curse thesis are frequently criticized for using theories and selected measures that invariably lead to false conclusions. It has been pointed out that measuring resource abundance in different ways leads to different conclusions. For instance Sachs and Warner, who have been credited in certain quarters to be the first to study the resource curse, measured resource dependence as the percentage of GDP from primary exports, and growth as per capita income. This method, it is agued, is not straightforward. It has also been pointed out that GDP is an incorrect measure for resource dependent economies, because GDP incorporates both natural and other capital depreciations (Neumayer 2004 cited in Angius).

Many scholars have called into question the very notion of abundance. It is argued that quantities of natural resources are not fixed and can be altered through exploration, technological change, and even by changing market prices. Wright and Czelusta (2002), maintains that the main failing of the resource curse thesis has to do with regarding natural resources as "endowments". It has also been claimed that most of the empirical studies conducted in the resource curse thesis set out to establish an inverse correlation between resource endowment and economic development, and so are not critical of the time period and other variables used (Kajander 2007).

2.4.3 Resource Curse for Rural Economies with Natural Resources

Rural areas with natural resources, especially mineral resources can also suffer from the kind of curse which Auty (1993) and others have argued affect countries with mineral resources. In Ghana and most other countries, mineral resources are owned and controlled by the state on behalf of the citizenry. Article 257 sections (6) of the 1992

constitution of the republic of Ghana as well as Section 1 of the Mining and Minerals Act 703 (2006) reads:

"Every mineral in its natural state in, under or upon land in Ghana, rivers, streams, water-courses throughout the country, the exclusive economic zone and an area covered by the territorial sea or continental shelf is the property of the Republic and is vested in the President in trust for the people of Ghana"

The state then reserves the right to issue, control and monitor mining concessions, as well as collecting royalties and taxes from such concessions. The state retains most of the mineral royalties it collects, paying only a meager 2% to the traditional authority and another 5% to the District Assembly within the area where the mineral is found (Section 267 (6)). Considering that to begin with, the royalties are only 3-6% of the gross value of the minerals produced, the communities concerned benefits very little directly from the minerals extracted from their environment.

Another factor that hinders rural areas from benefiting from their resource endowment is what has been termed 'internal colonialism' (Lipton, 1977). Internal colonialism is a system where urban-based elite uses their political and economic dominance to squeeze revenues from the rural majority. The former are able to do this because they tend to wield more political and economic power than their rural counterparts. The urban elites can therefore invest to acquire major stakes in resources located in rural areas. In addition, urban elites have more opportunities in education, and are therefore able to acquire specific skills that may be required in exploiting these resources. Where large companies control the rights to the particular resource, they would mostly hire people from the urban areas because these are relatively more qualified. Where the particular resource is not great enough to attract large multinational companies, government would normally grant small concession to several small firms to exploit the resource. Here again it is urban business people who have the skills, resources and necessary connections to be able to acquire such concessions. The rural people are left to engage mainly in illegal exploitation of their 'own resource'.

Government policies in most developing countries can also be used to explain why rural areas in such countries have benefited very little from the natural resource endowments. Government policies in these countries have often tended to favor the development of urban areas, neglecting the development of rural areas. All resources, including natural resource wealth in rural areas are amassed for the benefit of the former sometimes to the peril of the latter. The World Bank estimates that during the first two post independent decades, some two-thirds of all investment in Sub-Saharan Africa went into cities (1989 cited in Auty 1995).

All the above takes place in the face of the negative environmental consequences that accompany the exploitation of minerals resources. On mining, Rio Tinto (one of the leading mining companies in the world) notes that mining and its associated activities as digging negatively affects the environment. Digging a hole in the ground to gather mineral resources means that various aspects of the environment, such as land, water and ecosystems, will be affected.[11] Most of these adverse consequences are occasioned in the immediate environment of the communities where the minerals are located. This means that rural areas with mineral resources whilst benefiting very little directly from the mining activities that take place in their communities have to bear the negative effects impacted on their environment by such activities. These negative environmental effects will further lead to dire consequences for other sectors of the rural economy, most notably agriculture.

2.5 The Concept of Sustainable Development

In recent times, the concept of sustainable development has come to the fore front of the development agenda, and many attempts have been made by scholars and people in the development field to define and redefine it. Despite these many attempts and its wide usage in the development literature, no single definition of what exactly this concept involves has been reached. It is used differently in different perspectives and disciplines. Its wide usage and appeal just might be a result of the lack of consensus on exactly the concepts entails. This is what O'Riordan calls it 'its slippery nature' (1988 cited in Auty and Brown 1997). The above situation has meant that there is no clear agreement on how

[11] http://www.riotinto.com/documents/ReportsPublications/corpPub_Environment.pdf

to operational sustainable development. There is therefore no consensus among the various players in the development field on how to transform the numerous stated goals into practical measures to achieve those goals.

One of the numerous attempts at defining sustainable development has been by Ruud (2006; 136), for him, the removal and use of a resource may be considered to be sustainable if the amount of the resource removed does not exceed the rate at which it is replenished. That is, a "resource(s) can be exploited without depleting the physical stock of the (se) natural resource(s)". He however concedes that, this definition of the concept of sustainable development is a rather limited and narrow one. This is in view of the fact that when the concept is extended to refer to a group of resources or an ecosystem, the shortcomings of the above definition become apparent. This is because the removal and use of any of the resources at any rate will have effects on the other resources and elements in the ecosystem. So that it is no longer enough to consider just the rate at which the one resource is exploited and reproduced. This definition also ignores the social context in which the 'resource' is found. The economic and social activities, and actions and/or inactions of the humans involved in, or affected by the exploitation of the resource will also play a critical role in the sustainability of the resource. For Lafferty and Langheel (1999), sustainable development should be understood as a socio-economic process resulting in, and resulting from the level of social and individual welfare.

The best known and most used definition of sustainable development is that contained in the Brundtland report (WCED 1987). The Brundtland report contends that sustainable development is 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (quoted in Ruud 2006; 137). This definition is premised on two key concepts; the concepts of 'need', that of the world's poor in particular; and the idea that there exist limitations on every resource determined by the state of technology and social organization. Also implicit in this definition are humans and their needs. This is underscored in the report by its stress that 'our Common Future' starts with people. The chairperson of WCED (World Commission on Environment and Development) Gro Harlem Brundtland, arguing for this stance stated that "The environment does not exist as a space separated from human actions, ambitions and needs, and attempts to define it in isolation from human concerns

have given the very word 'environment' a connotation of naivety in some political circles" (quoted in Ruud 2006; 216-217).

Among other things, the Brundtland report was informed by the need to respond to the concerns that had been raised against the World Conservation Strategy (WCS) report which was published in 1980. The WCS report had been criticized for having what was called an 'anti-poor' profile (Soussan 1992, cited in Ruud 206). The report had maintained that poverty and the conduct of poor people was the main cause of environmental damage. It however failed to recognize that poverty itself could be a result of environmental degradation and pollution. Critics of the WCS report also argued that it was too deterministic. The report identified ecological goals as the basis for sustainable development. It argued that ecological principles and protection of the environment should be the guiding principles for human actions and activities. The Brundtland report however identified technology and social organization as determinants of nature's carrying capacity'. It noted, "The accumulation of knowledge and the development of technology can enhance the carrying capacity of the resource base" (quoted in Ruud 2006; 139). This represented a significant shift from the ecologically-based concept of sustainable development espoused by the WCS report.

2.5.1 Critique of Sustainable Development

Critics of sustainable development have agued that it is a redundant concept. Nordhaus for instance, has argued that the concept is unnecessarily restrictive (1992 cited in Auty and Brown 1997). For her, cutbacks espoused by proponents of the concept are both unnecessarily cumbersome and ultimately impractical. Dasgupta, another critique of the concept of sustainable development has expressed his reservation about the unnecessary sophistication of the sustainable development literature (1995 cited in Auty and Brown 1997). He argues that environmental resources provide an example of capital theory, and that the insights generated into inter-generational justice by the literature produced prior to the development of capital theory have much to teach those who are presently concerned with sustainable development.

The concept of sustainable development is also beset by several unresolved questions. The sustainable development literature has failed to deal with questions

relating to the time period concerned; that is, sustainable for how long? a generation, one century or a millennium? The literature is also silent on the level of appropriation it is concerned with, that is whether the level of appropriation it advocates are individual households, local villages, national economies or global economies? The exact target of sustainable development is also not specified, that is sustainable for whom? just humans, all living things or the planet in its entirety?

In spite of the above concerns raised against the concept of sustainable development, Auty and Brown (1997) maintains that the concept still performs a useful purpose as it has many assumptions in common with standard growth theory, which some skeptics believe to be a superior theory. They hold that Nordhaus' assertion that economic growth theory is superior to sustainable development stems from the greater flexibility which the former approach engenders. This is because many environmental problems can be carefully conceptualized as market failures which require for their correction with for instance the recreation of effective markets. Auty and Brown also hold that the more fundamental attacks on the economic approaches to sustainable development have come from outside the discipline.

2.5.2 Sustainable Development and Sustained Development

Related to the concept of sustainable development but some what different is the issue of sustained development. In contrast to sustainable development that encompasses environmental, social and economic concerns for both present and future generations, the issue of sustained development is concerned with ensuring that the present rate of growth and development is maintained in the long term, that is the outcomes of economic growth and development today will endure into the future.

The mining sector is characterized by the removal of non-renewable resources. Sustained growth in an economy dependent on the mining sector would therefore appear to be a difficult task to achieve considering that the finite mineral resources will eventually become limiting. When the above happens there will be the danger of having all the gains made by the exploitation of the mineral resource eroding away. The economy concerned might even become worse off than it was prior to exploiting the resource. If however the present growth is made to encompass improvements in such

areas as technology and education, then the rate of growth could be made to extend well into the future even if the mineral resource currently propelling that growth is exhausted. This shows that while it is important to formulate policies to manage resources sustainably, it is also important that such policies take due account of those who depend on the resources for their livelihoods. If this is not done it could have an adverse impact both on long-term growth rates of the economy and sustainability of the resources concerned. An ideal policy strategy is one that is concerned with satisfying the needs of the present population on a sustained basis and for those of future generations.

2.5.3 Mining and the Concept of Sustainable Development

As noted above, mining as an operation exploits non-renewable resources. Mining activities therefore seems to be in direct contrast to issues of sustainability, because whatever the rate of exploitation, the minerals removed will eventually be depleted. This has prompted writers like Simpson (1999; 3) to argue that mining is by its very nature not sustainable: On mining, he writes "A resource is extracted but not replaced and this will ultimately result in the resource being reduced to an economic zero".

In spite of this obvious difficulty, sustainable development as a concept has assumed an important position in the mining industry as demonstrated by the Mining, Minerals and Sustainable Development Project (MMSD)[12]. Environmental, social and economic cost which arises from mining activities has made it important that concerns about sustained growth and future generations be taken into consideration by the mining industry. Attempts have therefore been made to incorporate the concept of sustainable development into the mining industry. Various scholars have subsequently tried to define what sustainability means for the mining industry.

For Simpson(1999; 3), "Sustainability in mining means making the best use of a resource (mineral) to prolong its economic life…, (and) ensuring that the area containing the resource will be fit to support other livelihood sustaining activities when mining is history". On a study on the 'proliferation of Surface Mining in Ghana', Antwi-Boasiako Amoah (2003) considers the contribution of mining projects to development to be

[12] The Mining, Minerals and Sustainable Development Project (MMSD) was an independent two-year project of research and consultation looking at how the mining and minerals sector could contribute to the global transition to sustainable development.

sustainable if they are financially viable, environmentally sound and socially responsible. These three, he asserts, are at the basis of the challenges that the mining sector is faced with in contributing its quota to sustained and sustainable development.

Writing on small-scale mining, Hentschel et al. (2002; 27) have pointed out that, Agenda 2000 and past and present experiences from small-scale mining operations have helped to define what makes a small-scale mining sector desirable and sustainable. It is their view that a small-scale mining operation is considered to be sustainable if it meets the following criterion;

- Operation in harmony with the national mining sector development policies and the existing legal framework
- Operation complying and in concordance with international social standards, such as regarding social security, occupational health and safety, and labour regulations.
- Conventions about child labour, access to social infrastructure (schooling, medical etc.) and an acceptable level of income
- Environmentally sound operation
- Non existence of conflicts between the small miners and local communities or degradation of traditional values
- Harmony between the small operations and large scale mining operations
- Continuous operation over a longer period of time

They conclude that given the pivotal role played by the mining sector in developing countries (mineral rich countries); there is the need to ensure that mining activities are, economically, socially and environmentally sustainable.

A common theme running through the above attempts to define what sustainability means for the mining industry is that though it is prudent to strive to ensure that present generations do not use up all the mineral reserves, it is not this that will ultimately determine if a mining activity is sustainable. What is even more important is to strive to ensure that the mining activity does not alter the economy, the social setting and the environment in which it takes place to such an extent that it will become a hindrance for future generations to make a decent living. It is important to ensure that proceeds

from the mining sector are used to develop other sectors of the economy, and equip residents and future generations with appropriate skills and technologies that will enable them to continue to make a decent living when the minerals resources are used up (Summers 1992 cited in Auty and Brown 1997).

2.6 Summary

This chapter has taken a look at some theories that are relevant to this study. The resource curse thesis and sustainable development theories have been discussed. These theories have been discussed and looked at in the context of the economic, social and ecological consequences of the mining sector for rural communities. The chapter also examined the similarities and differences between large-scale and small-scale mining, zeroing down on artisanal and small-scale mining.

CHAPTER THREE

Methodological Approaches

3.0 Introduction

This chapter presents the methods and techniques used to collect the relevant data for the purpose of meeting the objectives of this research. The main objective of this study is to examine the extent to which ASM in Nangodi has affected the lives of the people of the area, and its economic and social development as a whole. The chapter looks at the chosen approach to fieldwork, carried out in Nangodi in order to collect data for this study. The chapter will explain the specific data collected and its usefulness within each method used to collect data. The chapter will also present sampling processes, sources of data collected, selection of communities sampled, and the organization and presentation of the results as well as the limitations to the research.

3.1 Sources of Data and Choice of Methodology

Two main sources of data- primary and secondary - were employed for the purpose of acquiring data for this research. The secondary sources consisted of both published and unpublished books, articles and government (particularly District Mining Office) reports on small-scale mining in the Nangodi area, where such data area are available. The primary sources however were the main sources used to acquire data for this research.

3.1.1 Primary Sources: How to Collect Data

This research relied mainly on the qualitative approach to collect primary data for this research. In recent times, qualitative research methods have increasingly been embraced by social scientists. These have been used with or instead of techniques borrowed from the experimental and physical sciences which long dominated research in the field. Qualitative research is a broad approach to the study of social phenomena. Marshall and Rossman (2006; 2), have asserted that “qualitative research is pragmatic, interpretative, and grounded in the lived experiences of people”. Unlike its quantitative opposite, the qualitative method “avoid(s) or downplay(s) statistical techniques and mechanics of the

kinds of quantitative methods used in, say survey research or epidemiology" (Silverman 2005: 6). Consequently, Martyn Hammersley has identified a common set of preferences shared by qualitative researchers. These include analysis of words and images rather than numbers, observation rather than experiment, meaning rather than behaviour and hypothesis-generating research rather than hypothesis testing (Cited in Silverman 2006). Rossman and Rallis, have identified five characteristics displayed by qualitative research, these include; taking place in the natural world, draws on multiple methods that respect the humanity of participants in the study, focuses on context, is emergent and evolving, and is fundamentally interpretative (2003 cited in Marshall and Rossman 2006). They also claim that the qualitative researcher views social phenomena holistically, systematically reflect on who she/he is in the inquiry is sensitive to her/his personal biography and how it shapes the study. In addition, they are of the view that qualitative researchers use complex reasoning that is multifaceted and iterative.

The choice to rely mainly on qualitative methods for this research was informed by the purpose of this study, which is to examine the extent to which the mining activities have affected the lives of the people of Nangodi, and by the decision to attempt to achieve the above by doing an in-depth examination of such effects through opinions generated from respondents and through personal observations. A study of this nature requires a detailed understanding of the complex relationships between the people, the community (the local economy and the environment), and the mining activities. Such "…detail can only be established by talking directly with people, going to their homes or places of work and allowing them to tell their stories unencumbered by what we expect to find or what we have read from the literature" (Creswell 2007;40).

A qualitative research will then give this study the opportunity to understand the real impact of the mining activities on the lives of the people of the area, by soliciting their personal narrative of events and effects of the situation. Marshall and Rossman (2006) are of the view that human actions and experiences are best studied qualitatively, because human thoughts, feelings, beliefs, values and assumptive words are involved, and are best captured through face-to-face interactions as interviews. A study of this nature can then provoke further studies that can rely on other methods as the quantitative approach or even a triangulation of different methods to compare and corroborate each

other.

3.2 The Choice of the Study Area

The fieldwork was carried out in Nangodi, a previously predominantly farming community which has become caught-up in ASM activities in the last 25 years. The inception of ASM activities in the area means that these activities have had to compete directly with farming and other economic activities for land, labour and other factors of production for investments. The importance of ASM activities in reducing poverty and in spear-heading rural development has become recognized in recent years as demonstrated by the MMSD (Mining, Minerals and Sustainable Development) and in Ghana by the passage of the Small-Scale Mining Act. In Ghana, this recognition has prompted only but little research in the field. Moreover, the findings of such studies have been inconclusive. Whilst some have found that mining leads to improved incomes and livelihoods (Hangi 1996, Eggert 2001), others have found that the negative consequences of mining far out-weighs any gains it brings about (Akabzaa 2000, Akabzaa and Darimani 2001). Most of these studies have been carried out in the southern parts of country (especially along the Western belt). Nangodi and other Northern communities which have also been affected by ASM activities have had to depend on such studies to determine the effects of ASM on their own local economies. This research chose to concentrate on Nangodi, to in its own small way, make a contribution to rectifying this anomaly, help to paint a clearer picture of the exact contributions of the ASM sector to rural economies and to draw conclusions which could be used as a guide to new policies or in changing existing ones.

3.2.1 Selection of the Communities

Three communities were selected for the field work; these were the main Nangodi Township, Zuure and Pwalego. The latter two are small villages under Nangodi. The selection of these communities was straight forward as these are about the only communities in the area where the mining activities are still important in their local economies. Mining activities in the other communities were said to have stopped some years back when the gold deposits in those place were all but used up. Most of the fieldwork was however carried out in the main Nangodi Township, since it is the most

important settlement in the area and is home to most of the miners (both indigene and non-indigenes alike).

3.3 Preparatory Stage

The fieldwork began with a reconnaissance survey of the study area; Nangodi. This coved the main Nangodi Township and surrounding villages of Zuure, and Pweledgo which have also been affected by the ASM activities. The purpose of the reconnaissance survey was to obtain a first impression of the area to be studied. A research assistant was first employed at this stage. Having already made contact with a prospective assistant, this stage was used to finalize the employment of the assistant. The research assistant was first tasked to study the research objectives and discuss potential questions and their suitability with the researcher. During this phase, a gatekeeper was also contacted with the help of the research assistant. This was a youth opinion leader[13] in the area. During the reconnaissance survey, some stakeholders in the mining business and some prospective respondents were also contacted. The preparatory stage was also used to test questions formulated for the interview sessions.

3.4 Pre-testing of Interview Questions

The pre-testing of the interview questions was done with one respondent in the Nangodi area, one from Zuure and a third from Pweledgo. This was done to check that the research assistant and the respondents shared my understanding of the questions formulated. The pre-testing aided in finding out if the questions formulated were appropriate for and suited the local situation. It also helped to ascertain that the questions were easily comprehensible to the respondents. Pre-testing the questionnaires also helped to establish contact with and decide on prospective respondents. The amount of time for the interviews sessions was also decided at this stage.

3.5 Technique of Data Collection

Sampling techniques used for the purpose of selecting and contacting respondents, to collect data for this research involved a combination of both purposive sampling and

[13] One whose ideas and behaviour serves as a model to the youth of the area

snowball sampling. Purposive sampling was used to ensure that all prospective informants have a fair knowledge of the subject matter of the research. For Bryman (2008) the aim of purposive sampling is to make sure that all sample cases/participants are relevant to the research questions being posed, whilst containing a good deal of variety. During the research process on the field, it appeared that almost everybody in the study area was conversant with the issues relating to the mining activities in the area. This seems to have been the case because the mining activities have affected the lives of almost everyone in the area directly or indirectly. In spite of the above, this study purposively sought to sample opinions from miners, small-farmers[14], some public officials and students.

I first tried to identify persons in the area who I was convinced would be able to provide this study with first hand and deep insights to the effects that the mining activities has brought to bear on the lives of the inhabitants of the study area. This was done with the assistance of the research assistant and the gate keeper. After establishing contact with some initial respondents, I proceeded to use the snowball sampling technique to identify other respondents. With the snowball approach, the initial group of contacts I had identified and made assisted me to identify and establish contacts with other respondents, whom the former were convinced will be able to will be able to assist this study with rich information (Bryman 2004, Marshall and Rossman 2006). One problem that can be associated with snowball sampling is the danger of getting caught in only one perspective to the detriment of other perspectives. As Bryman (2004; 102) has noted, with snowball sampling "…it is very unlikely that the sample will be representative of the (entire) populations". The purposive sampling, which had sought to gather opinions from different groups of people, however served to reduce this danger.

3.6 Sampling Size

Respondents to this research came from a cross-section of the population of the study area. Respondents included indigenes and non-indigenes, men and women, miners, small farmers and people from other economic activities in the area, a teacher and students

[14] As observed earleir, farming in Nangodi is mainly on subsistence basis, the term small-farmers will therefore be used in this study to denote people engaged in agriculture in the study area to differentiate them from farmers, a term that may be construed to mean people engaged in commercial agriculture.

among others. Semi-structured interviews were administered to 18 respondents, and in addition 12 respondents participated in a focus group discussion. The initial plan had been to have 15 respondents in the semi-structured interviews. This figure was however revised to 20 after the reconnaissance survey and discussions with the research assistant and the gate keeper. The revision in the number was informed by the decision to make some new additions in the interviews so as to have representations from all three selected communities. In the end however, only 18 of these interviews were held. Two respondents, who were to be among the very last interviewed, just before my departure from the study area, declined to participate citing a family emergency and ill health.

3.7 Research Assistant

Before the field trip, it was decided that the help of a research assistant would be needed to help identify and make contact with at least the initial respondents. Fortunately, a friend informed me that his cousin, who had just completed his bachelors, was spending some time in the area. I spoke to the cousin on phone and after a little conversation found that he would be an ideal assistant because he was enthusiastic and appeared to have a fairly good knowledge about the issues relating to the mining activities in the area. In addition, he had only recently completed his own research for his dissertation as part of his bachelors programme, and could therefore function independently to some considerable extent.

This latter competence of the research assistant was particularly useful since he was required to get some degree of acquaintance with the research questions. This he did very quickly and was able to make some useful suggestions of relevant questions which he thought would add some relevant data to the research. He also spent some considerable time discussing the relevance of some questions with me, and made suggestions for changes to some of them. The research assistant was also particularly useful in redirecting the attention of respondents anytime they wandered off the main issues being discussed.

Another reason that informed the decision to employ the services of a research assistant was to ensure that prospective respondents would freely discuss the issues raised in the interview questions without any apprehension. As Eshun (2008) found in her

research on community participation in the management of forest resource in the case of Kakum National Park in Ghana, some respondents are sometimes unwilling to respond to questions from a total stranger. The presence of someone known to them can go a long way to change this attitude towards the 'unknown' researcher and the questions he raises. Among other things, the research assistant was meant to fulfill this function. During the research process, the importance of the research assistant in getting respondents to open up more than they would otherwise normally do was realized anytime I was working alone, it normally took me more time in trying to explain and convince prospective respondents to agree to participate in the interviews. The research assistant was sometimes able to get people who had previously refused to be interviewed by me when I was alone to take the interviews with the two of us.

Despite the above, it also became evident during some interviews that some respondents were reluctant to speak of personal details in the presence of the research assistant because of their relationships with him. Anytime we sensed this, the research assistant excused himself and allowed me to continue with the interview with such respondents alone. Such respondents then opened up and spoke freely after assurances that personal details will be treated confidentially and anonymously.

Unfortunately however, the research assistant had to leave for a job interview in the nation's capital; Accra, one week before the fieldwork was scheduled to be completed. It was initially planed that he would help me to employ a new research assistant. But after meeting with two prospective assistants and failing to be impressed by any, I decided that I could do just fine with the rest of the research on my own.

3.8 'Gate Keeper'

As observed earlier, a 'Gate Keeper' was contacted to help me gain access to the study area and prospective respondents. The plan prior to the fieldwork was to contact the Unit Committee Member[15] to act as the Gate Keeper. However when he was contacted, he declined citing his busy schedule and an impending political party congress. The research assistant then suggested that we contact one Mr. Godwin Adongo. When he was contacted, he promptly agreed to participate in the research and help to introduce me to

[15] A Unite Committee Member is the lowest form of political representation in Ghana.

the community and to some potential respondents. The gate keeper was an immerse help to this research. From hindsight, it would have been difficult to find anyone with more knowledge of the mining activities and its effects on the quality of life of the people and the development of the area or more willing to share that knowledge. Having, himself been involved in the mining activities from a very young age, the gate keeper displayed wide ranging knowledge of the ASM activities in the area.

In addition to providing this research with invaluable information on the subject matter, the Gate Keeper was also able to help me identify and establish contact with other respondents. He also pointed out new directions to the research which had not previously occurred to me or come to my attention. He also suggested new additions to my research questions which he thought would be able to yield relevant information for the research, and also made suggestions that certain questions which he thought would be inappropriate be eliminated. For instance he thought that a question relating to income levels was not likely to yield any accurate information because records' keeping is rather poor among the people, and also because he thought the respondents would be reluctant to be open about such issues with a stranger. He even suggested that such questions might raise suspicion that I was from the government and that the research was to aid government to impose taxes on them.

One serious problem with the use of a gate keeper is the danger of having such a person trying to influence the outcome of the research by imposing his personal views on the research. It was therefore important to treat the opinions of the gate keeper as that of just another respondent. Also being an opinion leader, the gate keeper wields some power, though unofficial, in relation to other respondents. There will therefore be the danger of respondents introduced by the gate keeper entertaining fears of compulsion to participate in the research, and that their responses might bring about some repercussions on them. I always made it a point to explain to all respondents that the research was purely for academic purposes, and that if it was their wish, their responses would be treated with anonymity. I was always careful not to begin any interview in the presence of the gate keeper, so no respondent will feel intimidated in any way by his presence.

3.9 'Positionality'

I assumed a kind of ambiguous (border line) role in the field, in that in some instances I was considered an 'insider' and in other ways I was thought to be an 'outsider'. Insider/outsider status can have an influence at several levels of the research. Power relations between the researcher and the researched (respondents), for instance can be affected. A graduate student coming from abroad to do a research in a rural area, places the said student in a position of power in relation to his respondents, most of whom have only little or no education at all. Respondents could therefore feel intimidated by the presence of the researcher, and this can have an effect on their responses to questions posed to them and ultimately to the entire research.

My origin (as a native of a neighbouring community) however served to reduce this power gap and its potential adverse effects on the outcome of the research. Despite the fact that I have attained a higher level of education and travelled abroad, I was in a way also seen as an insider since I spoke a similar dialect, dressed in a similar fashion and mixed in easily with the locals. This would have been different if a foreigner, say a Norwegian national, was carrying out this research, his skin colour would then have made him stand out, and the power gap, more obvious. This insider status entitled me to "a superior, almost organic knowledge of the community not accessible to outsiders" (Mohammad 2002, 101). It should however be noted that my origin and attempts to blend in with the locals only served to reduce the power gap, not eliminate it, the power gap would thus still have an influence on the outcome of this research. As Mohammad has observed, attempts to distribute power more evenly between the researcher and the researched often lead to reconfirming it. I might have tried to dress like the locals and speak a similar dialect, but the power gap would still have been present and visible.

Not being resident, and unknown to anybody in the research area, I could also assume an 'outsider' role. The role of an outsider was particularly important in getting respondents to discuss personal issues with me. As observed earlier, some respondents were sometimes reluctant to get into personal details in the presence of the research assistant, because he was know in the community and was fully considered an insider. Respondents could then be worried of having their details leaking out to others in the

community. This was different with me since I do not reside in the area, and was going to be leaving after the research.

Also being viewed as an outsider, respondents provided me with almost all the information that they thought would be relevant for me to understand the community, the mining activities and the interplay between the two. With a total insider, respondents might take some knowledge for granted. Also a total insider can be presumptuous, taking his personal views and knowledge as the facts of the situation of the area. His version of the truth may be partial and bias, making objectivity and neutrality difficult.

3.10 Primary Data Collection

As stated earlier, primary sources provided the bulk of the data for this research. Qualitative techniques were employed to collect such data. The specific qualitative techniques used included the administration of semi-structured interviews, focus group discussion and direct observation in the three communities selected for this study.

3.10.1 Semi-Structured Interviews

Semi-structured interviews were used to solicit data from different stakeholders in the small-scale mining activities and in the community as a whole. A semi-structured interview guide covering fairly specific topics was administered to respondents. The responses then provided directions for further questions. Semi-structured interviews were preferred to structured interviews because of the study's interest in respondents' point of view. As Bryman (2008) asserts, such interviews have an advantage over structured interviews when it comes to soliciting rich and detailed responses from interviewees. Semi-structured interviews were also used as opposed to unstructured interviews because of the desire to have a kind of guide for respondents and myself to prevent swaying away from the main objectives of this study. In addition, a kind of guide was needed so that the research assistant could familiarize himself, so he could conduct interviews on his own if the need ever arose[16]. Though an interview guide was used, it was varied considerable depending on the category of respondents being interviewed, So that when miners were interviewed, the emphasis was on their mining activities, and when small-farmers were

[16] As it were, that need never arose, so all interviews were held by me with the assistant mostly present

interviewed, the emphasis was on the effects of the mining activities on their farmlands and farming activities.

Some of the interviews were conducted in English, with the literate respondents, and some were held in Namdam[17]. Since this language is similar to Grushie, my mother tongue, I was able to communicate fairly well with most the illiterate respondents. Whenever there was a difficulty in communication between any respondent and myself, the research assistant came in to explain and clarify things.

The first interview was held with the 'Gate Keeper' for the research. This first interview was meant to serve as an introduction to the area and the study. All issues that were thought to be relevant for the study were explored in this first interview.

Six male miners were interviewed. Two each from the three communities selected. The interest here was to solicit from these respondents the factors that led them into the mining activities. Their opinions on the effects of the mining activities on such economic and social factors as income, employment, infrastructure, education, health, housing and on other economic activities as farming were also collected. Two of the six miners interviewed were also small-farmers. One was a student and another described himself as a part-time business man. Only two said they were full time miners.

Three female miners also served as respondents in the semi-structured interviews. Two of these also work as small-farmers during the rainy season and sometimes trade in the local market. One woman each was interviewed from the three selected communities. These interviews were concerned with soliciting their views on the effects of the mining activities on their lives, the roles they play in the mining activities, and on gender relations in the study area. Another interview was also conducted with one woman who is a housewife. It is interesting to note here that though this woman works with her husband on the farm, she described herself as an unemployed housewife. To her, working on the family farm with her husband is part of her marital duties. It was observed that it is still fashionable to be described as a housewife here, unlike in Scandinavia, where Katrin Bennhold has noted that it is embarrassing to be called a housewife (International Herald Tribune 21/07-10). The interviews with the women afforded the research the opportunity to gain some insights into the effects of the mining activities on households, since women

[17] The native language of the people of the study area

by and large are the managers of most households in the study area, as well other parts of Ghana.

A nurse of the local clinic was also interviewed in an attempt to gain insights into the effects of the mining activities in the area on the health of the miners and the other inhabitants of the area. The assumption was that since most people in the area rely on the clinic for the treatment of their illnesses, the resident nurse would be privy to the kinds of illnesses suffered by the miners and was therefore the ideal person to give the study an insight into the effects of the ASM on health in the community.

Another interview was held with a teacher of the local Junior High School. The initial plan had been to interview the Head teacher, but he was unavailable. The mathematics teacher who doubled as the Assistant Head teacher agreed to take the interview. This interview gave the study an insight into the effects of the mining activities on school enrolment, attendance and education as a whole. Two students of the school were also interviewed to collect their opinions on the effects of the mining activities on their education and that of other students in the school. One student admitted he works with the miners after school and on weekends, and during the farming period; he helps his family on the farm.

Three small-farmers, one each from the three communities selected for the study were also interviewed to collect their views on the effects of the mining activities on their farming activities and farming in their communities as a whole. As the fieldwork was conducted during the dry season, getting the small-farmers to participate in the interviews was one of the easiest among all respondents, since they did not have to go to work on their farms. Below is a figure showing the composition of the different respondents in the interviews.

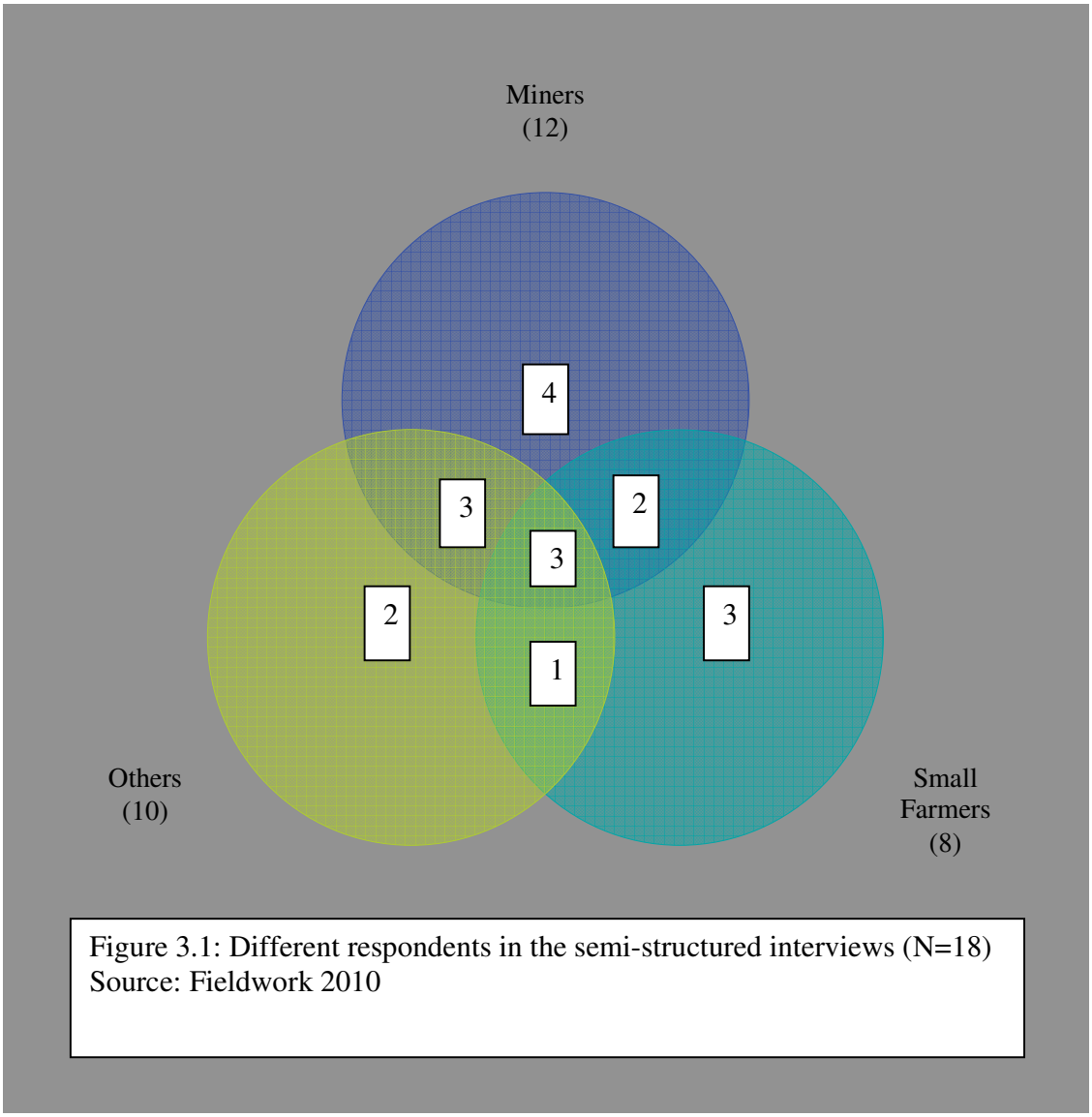

Figure 3.1: Different respondents in the semi-structured interviews (N=18)
Source: Fieldwork 2010

3.10.2 Focus Group Discussions

Focus Groups Discussions are group discussions exploring specific set of issues and interests (Bryman 2004). It relies on group interaction to generate data and construct meaning. This technique assumes that people's views and opinions are not formed in a vacuum. Listening to the views of others can often help people to understand their own and better articulate them. A "one-to-one interview(s) may be impoverished because the participant had not reflected on the topic and feels unprepared to respond" (Marshall and

Rossman 2006; 114). Focus group discussions were therefore used to supplement the data generated from the interviews.

Though this study had not planned to use focus group discussions as a technique to collect data, after consultations with the research assistant and the gate keeper, and with some personal observations of the research area, it became clear that this will be an effective tool to collect useful data for the research. Also, after the reconnaissance survey and a preliminary analysis of some data collected from the interviews, it became obvious that a focus group discussions will not only be necessary to crosscheck the data collected, but will also be an easy and convenient way to obtain additional information to meet the objectives of this study.

The focus group discussion was organized in the Nangodi Township. This community was chosen because it represents the center of the mining activities in the area, and being the biggest settlement in the area, it represented the best chance to convene a discussion with people from the different areas and different professions. The Focus Group was made up of 12 participants. I served as the moderator to the discussions. The research assistant was also present to help explain questions to the respondents when I found it difficult to do so. He also helped to translate some answers for me. Arrangements were made for 18 people to participate in the discussion, but in the end only 12 people showed up. My initial frustrations with the turn out became a relief when I found out just how difficult it was to hold a controlled discussion with even the 12 participants. From hindsight, I should have held two different group discussions with smaller numbers. Fortunately however, the research assistant was always at hand to help me out when the discussions seems to sway away from my control.

The selection of the participants in the Focus Group Discussion was made to reflect the different economic interests in the area, gender differences, indigenes and non-indigenes and the generational gap. Accordingly, the following members were part of the discussion; miners, small-farmers and students. Some non-indigenes were also invited to attend. Almost all the participants were very enthusiastic to share their views on the subject matter. Most of them had common views and so there were little disagreements during the discussion. Issues raised were discussed peacefully and each participant was allowed to share her/his views on every topic raised. Each participant was encourage to

freely share her/his views even if such a view was merely a repetition of what another participant had already shared, or even if it contradicted that of another participant. The discussions followed unstructured questions. This allowed me to broadly investigate each issue raised with some degree of flexibility (Bryman 2004). The Focus Group Discussion was scheduled to take a two hour period. The discussions however became so lively that it finally lasted for a little over three hours. Refreshments were arranged and provided to all participants.

On reflection, it is obvious that the absence of prior planning for the focus group discussion affected it in a number of ways. For instance, if a little research on focus group discussions had been carried out prior to the fieldwork, it probably would have been obvious that it is a difficult task to try to hold a controlled discussion with a large group. It might have been a good idea to divide the discussions into separate groups like miners and peasants, since the two groups seems to hold pretty extreme views on the effects of the mining activities.

Despite the above, the focus group discussion provided a very good opportunity to gain a deeper understanding of issues regarding the mining activities in the study area and its relationship with the economic and social development of the communities concerned. It also afforded the opportunity to gather different views from different participants at the same time.

3.10.3 Direct Observation and Imagery

Direct observation was also used to supplement the data collected by the other techniques. To suppose that any researcher's presence in the field would not exert an influence on the data is unrealistic (Strong 1974 cited in Silverman 2005). I therefore decided to make good that presence by using my observation on the field as part of the data for this study. Due to time limitation, direct observation was preferred to Participant observation which would have required taking up a role in the community. The use of observation in research involves "…studying both what people say they do and why, and what they are seen to do and to say to others about this" (Cloke P. et al. 2004; 3). This method assumes that people's behaviours are purposeful and expressive of deeper values and beliefs. The

use of direct observations, served to confirm some responses from the interviews and focus group discussions.

Direct Observation gave the research the unique opportunity to compare the data acquired from the other methods with what was personally observed. The observations confirmed most of the responses from respondents, but a few responses were contradicted. I was interested in observing for myself the state of school buildings, health post, roads, and housing among other social amenities in the community which can give an indication of standard of living. Direct observation enabled the research to get a clearer understanding of attitudes and behavioral patterns in the study area. These served to help give a better understanding to some of the responses received from the interviews and focus group discussion. Different aspects of the mining process, that of other economic activities as well as other aspects of community life were also observed. Several visits were made to the mining sites to see at first hand how the miners went about their work. I also spent some time with the miners in their places of relaxation after they were done with the day's works. This was meant to enable me blend in with them. As Trochim (2006) has observed a direct observer needs to be unnoticeable as much as possible whilst watching. This is to ensure that the people being observed can act their normal selves, instead trying to impress the observer.

I also relied on images in my efforts to understand and covey to my audience, the effects of the mining activities on the economic and social well being of the people of the study area, for as the adage goes 'a picture is worth a thousand words'. Images have the ability to capture situations exactly as they are, even if people are reluctant to participate in discussions on the subject matter.

3.11 Secondary Data Collection

Secondary sources were also solicited to complement the primary data. The secondary data involved research from books, journals, magazines, newspaper reports, articles, Internet materials and unpublished works related to the study**.** These for Trochim (2006) constitute an important source of secondary data. He also cites memos and transcripts of conversations as some other sources of secondary data. The purpose of using these

secondary sources was to review what literature there is on the effects of small-scale mining activities in the Nangodi area and other areas in Ghana.

3.12 Duration of the Data Collection

Six weeks had been intended to be used for this fieldwork. However due to some difficulties relating to travel plans encountered, the time period for the research had to be reduced to four weeks. Three weeks were used on the field to collect primary data through interviews, focus group discussion, direct observations and imagery. The remaining one week was used to collect secondary materials from the District Assembly, the Minerals Commission, from News Papers, and other secondary sources. Some secondary data was also collected during the first three weeks when the primary data was being collected.

3.13 Data Analysis

As observed earlier in chapter two, grounded theory is used in the collection and analysis of data in this study. In this method, data collection, data analysis and theory formulation proceed concurrently, repeatedly referring back to each other. In using this theory, I began the process of coding after initial data was collected. Coding in grounded theory is the process whereby data collected are broken down into components parts and labeled, looking for any potential theoretical significance that might emerge (Bryman, 2008).

The data obtained was organized by creating categories. The process of coding, as part of the analysis, involves 'generating concepts from and with our data' (Coffey and Atkinson 1996; 26). Processing and analysis of data for this study began on the field with transcription of the interviews. About half of the interviews were transcribed on the field before my return to Norway. It was important that the transcriptions start as early as possible so the research assistant could see how it was going and to make any inputs if there was the need for any. The transcribed data was then coded and classified to produce meaningful patterns. The coding and classifications was done on the basis of economic, social and environmental effects. Another level of coding and classification was based on gender, profession and origin (indigene and non-indigene). The purpose of these

classifications was to find similarities in the opinions and views among the different groups and effects.

The above was followed by interview analysis. This involved interpreting and verifying claims from the respondents. At this stage interviews were thoroughly read through one after the other, identifying and noting down key claims and explanation by the respondents. Analytical comments were then made, and identification and recording of the needed supplementary primary and secondary data in order to be able to verify the claims made by respondents. The next stage was to draw conclusions from the coded data. Conclusion drawing means 'beginning to decide what things mean, noting regularities, patterns, explanations, possible configuration, causal flows and propositions' (Miles and Huberman, 1984 cited in Silverman 2000; 177**).** This exercise, though time consuming, was very helpful in organizing and interpreting the data so as to answer the objectives of this study.

3.14 Validity and Reliability

Validity is concerned with truth; "interpreted as the extent to which an account accurately represents the social phenomena to which it refers". (Hammersley 1990, quoted in Silverman 2005; 210) All techniques of research in both the physical and social sciences have innate short comings; the methods used to collect and analyze opinions and other data in this research are by no means exempted from the above assertion. The important thing in every research is to try to minimize the short comings of the techniques used. Research that seeks to collect the opinions of people often suffers from doubts over answers that respondents volunteer. This is because; some respondents might be tempted to provide answers that are only ethically or generally accepted. Respondents might also be afraid that answers provided could be used against them, as in taxation or as in an illegal mining sector, to arrest and prosecute them. This has the tendency of leading to validity and reliability problems.

The techniques used for the purpose of collecting data for this research are affected by the sort of errors discussed above. In addition to the above, the validity of the data collected may be affected by the respondents' comprehension of questions asked and the reasons and purpose of the research. If respondents have any reason to doubt the true

intensions of the research, they may be reluctant to participate in the research and even when they do, they may be tempted to be less truthful, thereby affecting the validity of the research concerned. It was therefore important that at all times I present myself as a student, and explain to respondents that data collected was solely for academic purposes. The introductory letter from the Head of the Program was important in achieving this. Associations with the research assistant and the gate keeper also helped to achieve the above. The snowball technique used to sample respondents also meant that winning the confidence of the initial respondents was important in convincing latter respondents. These then served to increase the validity of this research.

It has also often been argued that qualitative researchers might select only those fragments of data which support their arguments, putting the validity of the findings in doubt. The use of different data collection techniques served to ease such concerns. As observed earlier in this research, data has been acquired through semi-structured interviews, focus group discussion and direct observations as well as from some secondary sources. The different techniques used served to corroborate and confirm each other. Direct observations and the use of images for instance helped to cross-check the data collected from the interviews and focus group discussion. The use of the different techniques was also important in confirming and validating the responses from the respondents.

Reliability is concerned with "…the extent to which results are consistent over time, and an accurate representation of the total population under study…" (Joppe 2000 quoted in Golafshani 2003; 598). If the results of a study can be reproduced under a similar methodology, then the research process is considered to be reliable. For Lincoln and Guba (1985) "…there can be no validity without reliability, a demonstration of the former is sufficient to establish the latter" (quoted in Golafshani 2003; 598). As we have seen above on validity of this study, various measures were instituted to ensure that the research is able to acquire reliable information from respondents. It is therefore my contention that a seminar research with the methods used in this research would replicate the findings of this research.

In spite of the validity and reliability problems that this research might face, the data collected so far in this research have been important in helping to paint a good

picture of the effects of ASM on the economic and social development of the study area. The validity and reliability of the data in this study are regarded as 'good enough'/and relevant as a basis for analyzing the effects of ASM activities in Nangodi.

3.15 Limitations of the Study

One of the main problems this research encountered was with regards to the amount of time available for the fieldwork. Travel permit problems I encountered meant that I was unable to travel to Ghana during the summer of 2009 to conduct the fieldwork. I was only able to undertake the trip in February 2010, and since I was working to submit this study in May, 2010, I had to reduce the time spent on the field to only to a few weeks, instead of the two-three months that could have been used in the summer. The limited time meant that I was less able to conduct this research in ways I otherwise might have wanted to, especially when it came to rescheduling interviews. For instance, though the initial intension had been to interview the Head Teacher of the local High School. He was unavailable when I visited the school. He was away and was expected back in two weeks. If I had more time, I could easily have afforded to wait till the Head Teacher got back, but as it were, I had to ask the Assistant Head Teacher to take the interview. Despite the above it must be added that the important fieldwork was not impaired by this challenge, as the research objectives and targets have been met.

Another problem encountered during the fieldwork was the untimely departure of the research assistant. As stated earlier, the research assistant was unable to assist me through the whole fieldwork, as he was called away. Attempts to find a suitable replacement failed to materialize. The untimely departure of the research assistant meant that I had to handle the interviews all by myself. Situations that arose thereafter, as miscommunication that required clarifications by the research assistant became a bit problematic. I sometimes had to call in a by-stander to try to help clarify issues relating to the language gap. Since I did not know such by-standers, I could not tell just how accurate their interpretations would be. Fortunately, however, only two such occasions arose and would therefore have little impact on the final results of this research.

Another difficulty brought about by the untimely departure of the research assistant was in relations to contacting some prospective respondents, whom the research

assistant had arranged to be interviewed later. A respondent to one of the very last interviews which I had planned to have before my departure from the study area could not be found. He had agreed with the research assistant, prior to the latter's departure, that he would meet with me in the village square, but he did not show up when the interview was due.

The distance I had to travel to the communities chosen for this researcher was yet another problem encountered during the fieldwork. Unable to find a suitable accommodation facility in any the three communities chosen for the study, I had to commute on a daily basis to the communities to conduct the field research. I initially used public transport to move from Bolgatanga (the regional capital) to the study area daily, but found that these were not reliable, especially in the evening when I wanted to return to Bolgatanga. I had to then borrow a motor bike to cater for my own movements.

The acquisition of secondary data was another problem area this study faced. Efforts to pass a Public Information Bill into law by the Parliament of Ghana, has met fierce resistance from some sections of the Ghanaian population. It was found that some Government agencies and personnel are very reluctant to divulge information to persons outside of those agencies. The introductory letter from the Head of the Department served to lessen this unwillingness on the part of some Government officials. Hopefully when the Bill is finally passed into law, this problem should become a thing of the past.

3.16 Summary

This chapter has presented and discussed the various methodological choices, methods and techniques used to collect data for this study. It looked at how preparations were carried out to facilitate the fieldwork, how the fieldwork itself was approached, and how the data acquired on the field was handled, broken down, organised and analysed in an attempt to answer the objectives of this study. The chapter also considered and discussed sampling processes, various sources of data collected and the challenges encountered in the study.

CHAPTER FOUR

Data Analysis and Discussions

4.0 Introduction

The present chapter will present and analyze the data collected from the field work in the study area. For purposes of understanding and providing a clear oversight, the data collected is presented systematically under a number of themes; economic effects, social effects and environmental effects. The data and themes are presented in such a way as to enable this study answer its objectives. Where necessary, these themes will be further divided into sub-themes so as to enable the study present the data in a systematic fashion and convey to its readership the effects of the ASM activities on the economic and social lives of the inhabitants of Nangodi. The study will also in this chapter discuss some of the challenges faced by the people of the area in their quest to use the ASM activities to improve their standard of living. The data sources from which these results are based include the semi-structured interviews, focus group discussions, images, and direct observations discussed in the previous chapter. These primary data are discussed vis-à-vis some related and relevant literature (secondary data) collected. A look at the demographic characteristics of the respondents precedes the presentation of the empirical data.

4.1 Back Ground of Respondents

As stated earlier in the previous chapter (Methodological Approaches), 18 respondents participated in the semi-structured interviews and there were also 12 respondents in the focus group discussion. The respondents ranged in ages from 12 to 65 years old, covering the different generations to be found in the study area. The table below gives a breakdown in ages of respondents.

Table 4.1 Distribution of Respondents by age

Ages	Semi-structured Interviews	Focus Group Discussion	Total
12-20	3	2	5
21-30	6	4	10
31-40	4	3	7
41-50	3	3	6
51+	2	0	2
Total	18	12	30

Source: Fieldwork 2010

As can be seen from Table 1.1 above, the 21-30 age group had the highest number of respondents (10). The second highest age group was the 31-40 with 7 respondents. These age groups, together with the 41-50 age group with 6 respondents, represents the active working class, and therefore explain their greater representation. There were 5 respondents below 20 years old. The major concern with that age group was to find out if they are any child labor practices in the mining activities, and the effects of the mining activities on school attendance. The 51 + age group was the least interviewed with only 2 respondents and with no representation at all in the focus group discussion. This latter age group might have been the least represented, but these interviews were of particular importance to the research, because these respondents have lots of experience and have been witnesses to the various phases of the ASM activities in the area, and are therefore better placed to appreciate the real impacts of the mining activities on the area's economic and social development.

4.2 Effects of ASM on the Development of Nangodi

The actual impact of mining activities on communities and national economies has been the subject of much debate by scholars and other people interested in the subject area.

The ASM sector has occupied the attention of most of these people in their attempt to either critique or justify the mining industry. As observed earlier under the 'Resource Curse Thsis'(in chapter two), proponents of this thesis as Auty (1993) and Ulrich (2007) have expressed the view that there exist an inverse relationship between mineral resource endowment and (sustainable) development. Others scholars as Akabzaa and Darimani 2001, Hentschel et al 2002, Kwai Pun 2007 have gone a step further to ague that booms in mining activities often leads to considerable economic, social and environmental cost. Despite these assertions, many governments and people around the world continue to view the mining industry as holding the potential to contribute to employment opportunities; income levels, foreign exchange earnings and the development of infrastructure and other economic sectors. It has been asserted that the sector can generate incomes for local people and can improve local purchasing power for locally produced goods and services. It therefore has a huge potential to act as a stimulus for sustained rural economic growth and development. A research and a workshop conducted by MMSD on artisanal and small-scale mining have shown that the ASM sector is a "significant generator of rural livelihoods and has the potential to alleviate poverty and be a tool for sustainable development" (Hentschel et al. 2002; 12).

Below, an attempt is made to assess the economic, social and environmental effects of ASM activities in Nangodi in light of the data collected. The hypothesis of this research is that the ASM activities will negatively affect the economic and social development of the area in the long term. The data collected are now presented and discussed to see if the above hypothesis holds true in the research area.

4.3 Economic effects of ASM Activities in the Area

4.3.1 Employment

Around the world, the ASM sector is a major employer in many rural areas, especially in the developing world. A recent ILO research found that there are about 13 million people employed directly in the ASM sector worldwide. The livelihoods of a further 80-100 million people are affected by the sector (Hentschel et al. 2002). In Ghana, it is estimated

that about 300 000 to 500 000[18] people are employed by the sector (Tschakert 2009). In Nangodi, the introduction of small scale mining activities has provided an alternative source of livelihood to the rural population, who hitherto depended almost entirely on agriculture for their survival. This was the view expressed by the gate keeper as well as most of the other respondents in the interviews. This was also the consensus from the focus group discussion. The small-farmers who double as miners, also expressed the view that several years of continuous cropping and cultivation of the land has taken a heavy toll on the soil's fertility, thereby affecting the ability of the farmlands to continue to support their families. The mining activities therefore offer them an opportunity to look for extra cash to take care of their families. One small-farmer had this to say:

> *The farmlands are no longer as good to us as they were to our fathers and to our grandfathers in the olden days. The food we get from the farms can no longer support our families through the lean periods. The mining activities have therefore been a gift from the gods to help us take care of our families.*

Agriculture in Nangodi depends almost entirely on rainfall, and as have been discussed in chapter one, rainfall here is seasonal (from May to October). Little farming activities take place in the ensuring long dry season. Seasonal unemployment was thus a major problem in these communities prior to the introduction of the mining activities, since agriculture was (is) the major employer, little wonder therefore that the small-farmer seen above should describe the mining activities as "a gift from the gods". The mining activities have thus offered the people of the area an avenue to seek employment during the long dry season when agriculture offers very little by way of employment.

In addition to providing direct employment, the ASM activities in the area also provide indirect employment in support services to the miners and induced employment in other sectors of the local economy. Indirect and induced employment is particularly important to women; whose roles in the main mining tasks are limited.

[18] Hilson and Banchirigah (2009 cited in Hilson 2009) puts the figure at about a million

4.3.2 Income Levels

Income level is one aspect that communities participating in ASM activities are expected to benefit from. Attempts were made during the fieldwork to assess the effects of the ASM in Nangodi on income levels. The table below gives an indication of average income levels of people involved in the two major economic activities in the study area; mining and farming.

Table 4.2 Monthly Income distribution of miners and small-farmers in Nangodi (in GH Cedis). 1 GH Cedis = 0.70 US Dollars

Occupation	Average Income	Minimum	Maximum	Number of respondents
Small-farmers	15	13	22	6
Miners	223	85	5 20	6
Small-farmers + Miners	150	72	464	5

Source: Fieldwork 2010

The table above shows a striking difference in incomes generated by small-farmers and those engaged in the ASM activities. Whereas the average income earned by those in subsistence farming is a meager 15 GH Cedis a month, their counterparts in mining makes an average of 223 GH Cedis a month. Also whilst the most earning small-farmer makes a monthly income of only 22 GH Cedis, the least earning miner makes 85 GH Cedis a month. It therefore goes without saying that in terms of income levels, the mining activities have been very beneficial to the people in the study area engaged in it. Also worth noting is the income of people engaged in both economic activities. Whilst the people in this category earn significantly higher incomes than those engaged in only subsistence farming, their income levels are also significantly lower than those engaged in mining on full time basis. Specialization might be the reason for the higher incomes of those who expend all their efforts and resources on mining alone. It is however important to add here that the incomes levels cited are only a rough estimates, because as stated

earlier records keeping in the area is poor, and in addition people in these parts are normally reluctant to divulge their exact incomes even if they know them. In spite of this, these estimates do give an impression regarding the range of income levels in Nangodi.

A number of reasons could account for the rather sharp contrast in earnings by the small-farmers and their counterparts in mining. Among other things, most of the small-farmers work on a subsistence basis that is they only grow enough food for family consumption and only usually sell whatever is left over after family consumption, and as such could find it a bit difficult to value their produce in monetary terms, or even the exact yields from their farms. In additions to the above, farm produce only fetch a small price on the local market, where demand for them is low. In contrast, there is a huge demand and market for the gold in the big cities of Accra and Kumasi, and ultimately Europe and America.

It must however be added that dependence on demand from elsewhere, and particularly on world market prices for their gold makes miners here and other parts of Ghana very vulnerable. Their income (that is the money they can get for their gold), invariably depends on prevailing world market prices, which are more often than not, unstable. These miners can do very little to influence world market prices and are therefore left very vulnerable by the frequent changes of world market prices for gold.

The manual nature of the work of the miners here also leaves their income vulnerable. One common complaint that rang through the interviews with the miners was the lack of machines to help them in their work. This lack of machine impedes their work, especially in the raining season when the shafts are filled with water. A miner for instance held that:

> *When the rains come we have to stop working, since we do not have the machines to drain out the water that become accumulated in the shafts. Our incomes are therefore affected by the rains. Some of us have to go back to the farms to make something, even if it is small for our families and ourselves.*

Most of the miners therefore earn very little or no income at all during the raining season. The miners commonly argued that if the authorities could come to their aid to help them

acquire the necessary machines, their incomes from the sector could be greatly improved. This could intend help to improve the income of people in other economic sectors and the growth of those sectors. For instance the increased income of the miners can help to improve the incomes of the small-farmers, in that if the miners are able to spend more time in the shafts to improve their own income, they would not have time to grow their own food, there will therefore be an increased demand for food stuffs and hence higher prices and incomes, since the miners mostly depend on locally produced food. Higher income all around (for miners, small-farmers and people in other economic sectors) can then promote savings and investments in all sectors, leading to the economic and social development of the local economy.

4.3.3 Agriculture

Agriculture is one activity that often comes into conflict with mining activities, as the two compete for common land and labour resources. The small-farmer respondents expressed the view that though the mining activities have been beneficial to some of them in a number of ways[19], they believe that their farming activities have been adversely affected by them. They complained of destructions to farmlands, as most miners do not refill pits after the land have been exhausted. In direct contrast to the small-farmer who described the mining activities as a gift from the gods, a 65 years old male small-farmer had this to say about the mining activities in the area

> *These mining activities have been a real hell for us, small-farmers and the Nangodi community as a whole. Those involved in the mining go about these activities with no regard whatsoever to the land. They desecrate the land with impunity forgetting that the land is the home of the gods. If the gods become angry, they are sure to strike back, and the consequences will be terrible for everybody.*

[19] See under employment above

Figure 4.1: A picture showing damage done to farmlands by mining activities in Nangodi
Source: Fieldwork 2010

Most respondent miners admitted that they do not refill pits before they move on to other places to explore new pits. Several reasons were advanced by the miners for this; some maintained that most of their pits are kept as 'ghettoes'[20], where mining continues. Others also claimed that their mining activities are mostly in the bush where the lands are not used for farming purposes.

It is important to note that on issues relating to the ASM activities, there was a sharp contrast in the views of small-farmers who are also engaged in those activities and those who are not. Whereas the small-farmers who sometimes work as miners tend to have a favourable view of the mining activities, their counterparts who never work in the sector mostly thought the mining activities have had an adverse effect on farming and livelihoods in the community as a whole.[21] This was one of the few issues that brought up a heated, but still lively, debate in the focus group discussion.

[20] These are large and deep shaft/pits maintained by miners
[21] Such contrasting views are captured at their sharpest in the two quotations above (the one by the small-farmer above and that by the small-farmer under employment).

It also emerged from the focus group discussion that farm animals sometimes fall into and get trapped in the abandoned shafts.[22] Most of such animals drown, or die due to injuries sustained through such falls. One respondent claimed that:

> *Last year one of my two bulls, which I use for ploughing my farms, and the farms of other people for a fee, fell into one of these abandoned pits. Though it did not die, it broke two legs and some other bones, and became very weak. I could no longer use it to plough, and had to sell it to the abattoir in Bolgatanga. Fortunately I have since been able to buy a new bull to replace it.*

Respondents claimed that community elders had made efforts to get miners to refill abandoned shafts before moving onto other place to explore, but so far little has been achieved by such efforts. They also said that though no child had fallen in an abandoned shaft, they are fears that this could happen one day. Below is a picture of an abandoned shaft.

Figure 4.2: A picture showing an abandoned shaft

Source: Fieldwork 2010

[22] Farm animal here are kept on a free range system, that is they are allowed to roam freely in search of their own feeding

Observations made during the fieldwork showed that, in places where mining activities have taken place, the top soil which usually contains nutrients required by plants is scrapped off by the activities of the miners, and may require several decades to rebuild. In addition the waste dumps and ore stock piles can result in sterilization. Leaching and percolation can also contaminate the land with chemicals like mercury used by the miners, leaving the land of little use to plant life and agricultural production in general.

It also emerged from the interviews that farming activities in the area have suffered from losing labour to the ASM. This loss of labour have been brought about by both push and pull factors from the agriculture and the ASM sectors respectively. Most of the youth of the area have been forced to abandon the farms because of dwindling yields, and have been attracted to the ASM sector by the superior incomes from that sector. Agricultural yields here, like elsewhere in Northern Ghana have been badly affected in recent years by erratic rainfall patterns and continuous cropping (monoculture) over several decades. Destructions of farmlands by the mining activities have also taken their toll on the agricultural production and yields, forcing many more people to abandon the farmlands.

4.3.4 Indigene verses Non-Indigene Involvement

Though most respondents thought that the ASM activities in the area had led to increased employment opportunities and incomes, this study was interested in finding out how much of these increased opportunities are available to the indigenes of the area. One study Boateng (1996) has shown that, small-scale mining operations in the Upper East Region were mainly taken up people from other places. The study showed that the proportion of indigenes employed by the sector in the Bolgatanga and Bawku districts, constituted a meager 13%. This study was therefore interested in finding out if this claim holds true to the Nangodi area as well.

Most respondents thought that they are more non-indigenes involved in the mining activities in the area than indigenes. Whilst some thought that as many as 80 percent of miners are non- indigenes, most accepted that the figure was much closer to two-thirds. A respondent had this to say about the situation:

Though we had been aware for some time that our land contained some deposits of gold, we did not think it was possible for us to use simple tools and techniques to exploit it. It was the non-indigenes who came here to introduce us to the ASM activities. In the beginning they were the only people doing the mining, but gradually many local people began to work with them and to learn how to mine on their own. They are many local people now involved in the mining activities than in the early days of the mining activities here, but the non-indigenes are still in the majority.

There was a general consensus during the focus group discussion and by most respondents that majority of the people engaged in the ASM sector come from other paces-either from towns and communities within the region as Bolgatanga, Bawku, Zuarungu, Zanleregu or from other regions. Attempts to find the exact numbers (proportions) of indigenes and non indigenes engaged in the mining activities were fruitless.

Respondents cited several reasons for the above trend; for one they claimed that the non-indigenes are better equipped, most indigenes are unable to raise the capital needed to purchase the machines used during the mining processes. It also came up that the non-indigenes are relatively better skilled. Most of them have experiences from the large-scale mines in the Southern part of the country or from other ASM areas. These factors are a clear demonstrations of 'internal colonialism' discussed under 'Resource Curse Thesis' (in Chapter two). The non-indigenes are able to dominate the mining activities here because they are better financed, equipped and skilled (Lipton 1977).

It is worth noting that the only mining concession in the area has been offered to a group of non-indigenes who came together to form a small-scale mining company-Teldol Mining Ventures. This company has the most advanced mining equipments to be found in the area, and is therefore able to carry on its mining activities all year round. Efforts to meet with a representative of the company were did not materialize. Here again the non-indigenes have been able to take advantage of their better finances, connections and knowledge of the law (requirements to obtain a concession) to obtain the only concession in the area.

Some non-indigene respondents expressed the view that as more and more indigenes take up mining activities, it is becoming increasing difficult for them to secure plots of land on which to mine. The competition from the indigenes has meant that the non-indigenes often have to pay a lot more money to the owners of the lands on which they want to work on. A few non-indigene also complained of efforts been made by some unscrupulous people in the area to frustrate them and thwart their mining activities. One non-indigene respondent described how he was given a raw deal by an indigene:

> *I was once working on a piece of land with some very encouraging returns. I suspected that the gold deposits stretched into an adjourning piece of land. I contacted the owner with a proposal to be allowed to dig into his land, but he refused. Not long after, he offered it to an indigene at a much lower price than what I offered to pay him. When we first came here in the early days of the mining activities in this place, this was unheard of. At that time, all we had to do when we wanted to work on somebody's land was to buy the one kola and a bottle of akpeteshie*[23].

The gate keeper confirmed that there was a general feeling that if more local people get involved in the mining activities, the community would be in a better position to benefit more. He also claimed that though there had been a few rumors of calculated efforts by the indigenes to push out the non-indigene. He was certain that such rumors were baseless. To him some non-indigenes were just peeved by competition from the indigenes. This to him was inevitably and even a good thing for the non-indigenes because it was the participation of indigenes in the ASM sector that makes the whole venture worthwhile. If the non-indigenes were alone in the sector, the community might have taken a different view of the mining activities considering the perceived huge environmental and health cost of the sector.

It also emerged from the interviews that not only are the indigenes the minority in the mining activities, but also they are mainly involved in less rewarding and more tedious mining tasks as digging and pounding of rocks. With their superior skills,

[23] Akpeteshie is a home-made alcoholic beverage produced in Ghana and other parts of West African by distilling palm wine or sugar cane juice.

equipments and finances, it is mostly the non-indigenes who are able to know which fields posses the gold ores. When they have been able to acquire the necessary permission to proceed to explore such fields, they then hire some local hands to help them in digging and in some of the more difficult tasks. The indigenes are therefore left marginalized in the mining activities, getting only a little fraction of the benefits accruing to the mining sector in the area. This reinforces the view that though the ASM sector is poverty-driven, the poor are often used by affluent people from outside the actual mining areas, and it is these people who are the actual beneficiaries of the mining activities, as discussed under Artisanal and Small-Scale Mining in Chapter Two (Smit 2007 cited in Tschakert 2009).

4.4 Social Effects

4.4.1 Education

Education is one aspect of the social development of the area that this study was interested in finding out the extent to which the mining activities have affected, and the nature of those effects. The Assistant Head Teacher of the local High School interviewed, claimed that the participation of school children in mining activities negatively affects their attendance, and ability to learn in school. It emerged that reasons why children get involved in mining activities include contributing to family incomes, to help pay their fees, buy school uniforms and to buy books.

The students interviewed contended that though they would prefer not to work, so as to have more time to concentrate on their studies, their participation in the mining activities helped them to sponsor their education. The students did concede that working in the shafts did make them tired and often they did not feel like coming to school, and that they are almost never able to concentrate fully in class or even do their home work. A thirteen year old male student insisted that:

> *If I don't work, I can not go to school. My father died when I was still only a baby. My mother is hard working, but there is no way she can cater for the education of my three brothers and I all by herself. I also have two sisters, but they are not in school. They help our mother in the market. I have to work for the miners to get a little money to help my mother. When I am unable to find any work with the miners, I sell kola in the market after school.*

It also emerged from the interviews that, revenues realized from mining activities enable many residents to send their children to school. One respondent for instance argued that it was from the income he makes in his work in the ASM sector that enables him to sponsor his 3 brothers in school. He said one brother is in Senior High School in Bolgatanga, and he often have to send him money for his upkeep. He, himself had to give up his education when he completed Junior High School because his parents who are small-farmers could not sponsor him to Senior High School.

Though most respondents argued that children of school going age are not allowed to participate in the ASM activities during school days, and that only those above 16 years are allowed to work in the shafts, some very young children were observed working in the shafts during school hours. Below is a picture showing a boy not older than 10 years who was working with his elder brother (himself just 14 years old) in one shaft on a Wednesday afternoon, a time schools were in session. Even more worrying was the fact that the two were working all by themselves with no supervision from an adult. In the event of any eventuality (say an accident), it may be several hours before anybody will miss them. In a discussion with the 'gate keeper', he thought that most of the respondents were too ashamed to admit that children work in the shafts, or work instead of going to school. It will also appear that respondents did not want to admit that they were aware of violations of a rule passed by the community that children of school going age should not be allowed to work in the mines during school hours and also that young children should not be allowed to go into the shafts.

Figure 4.3: A picture of a young boy climbing out from a shaft

Source: Fieldwork 2010

Figure 4.4: A picture of two young brothers taking a break from work in a shaft

Source: Fieldwork 2010

On the provision of school infrastructure, the Assistant Head Teacher said he did not think the mining activities in the area had in any way contributed to the improvement of such facilities. Though a new school block was observed during the fieldwork, this was said to have been provided by the District Assembly in conjunction with some Non Governmental Organizations (NGOs). This is said to be part of the District Assembly's aim of making educations more accessible to all children in the district, and did not have anything to do directly with the ASM activities.

4.4.2 Implication for Health and Safety

Health and safety was another social concern that this research looked at during the fieldwork. The nurse of the local clinic interviewed cited the most common illnesses affecting people in the study area to include malaria, river blindness, tuberculosis, cholera, pneumonia, gonorrhea and upper respiratory track infections. Most of these she suspected can be attributed to the mining activities. The upper respiratory track problems she thought was due to the long hours people spend digging pits and breaking rocks manually. She argued that she was convinced this was the case because it is mostly people engaged in the mining activities that suffer from these infections. The incidence of malaria, she argued was higher in the mining communities than other surrounding communities because stagnant waters in abandoned pits are a conducive breeding ground for mosquitoes, the insects that carries the malaria parasite. She also thought that cholera was due to the unsanitary conditions in the mining ghettoes. For the sexual transmitted diseases as gonorrhea, she thought was a result of the unsafe sexual practices among the miners. Here again, she asserted that the incidence was much higher among miners than other people.

On the subject of health, there was disagreement among the respondents of the focus group discussion. Whilst most thought participation in the mining activities adversely affects people's health, some maintained that it was just 'a state of the mind' (psychological), since most of the common illnesses in the area are actually not new, and people in the area had suffered from such illnesses long before the advent of the ASM activities. The interviews with the miners also produced a divided opinion on the effects of mining on their health. Those who thought that mining adversely affects their health

argued that the unsanitary conditions, inhalation of dust, tedious task of digging and pounding rocks, lack of protective clothing and exposure to chemicals were some of the factors that expose them to the illnesses.

On the issue of safety, almost all respondents agreed that, accidents had been frequent in the earlier stages of the mining activities in the area, but had almost been eliminated in recent times. Respondents thought this was the result of some safety measures introduced by the leaders of the communities. One measure which they argued had been very effective in doing away with fatal accidents is the requirement for all miners to have a wooden structure in place to support the shafts. Below is a picture of one such structure.

Figure 4.5: A wooden structure used to prevent the pit from carving in.
Source: Fieldwork 2010

On the provision of health facilities, only one clinic was observed in the study area. This was said to have been provided by the government. The nurse thought that, if anything the inflow of miners from all over the country into the area rather puts a lot of pressure on the only clinic in the area. This she said had prompted the District Assembly to vote funds for renovation and expansion of the clinic. This singular act of the District Assembly is a testament that the authorities are aware of the illegal mining activities and the health situation of the miners. They might be reluctant to regularize their activities, because of fears of their own capacity to monitor the compliance of the many ASM operators here and other parts of the country, but they are concerned of the health and other effects of the mining activities on the communities in which they take place. Below is a picture of the clinic and the renovation works been carried out.

Figure 4.6: Nangodi clinic

Source: Fieldwork 2010

Though this study did not carry out any systematic research into the kind and nature of illnesses suffered by miners and other people in the mining communities[24], the interview with the resident nurse and other people all seems to point to the fact that the mining activities do adversely affect the health of miners and other people in the study area. The use of mercury for processing is one danger to health status of miners that they seem to have little knowledge about. According to Hilton et al., exposure to mercury can result in; kidney pain, respiratory problems, dizziness, gingivitis, and muscular tremors; psycho-pathological symptoms such as depression and exaggerated emotional responses, which can be taken for alcoholism, fever, or malaria; dysfunction of kidneys, vomiting, and potentially death (2003 cited in Tschakert and Singha 2007). Though almost all miners admitted to suffering from some of the Hilton's list occasionally, none attributed it to their exposure to mercury. Mercury released in water bodies can also contaminate the water and fish posing critical health risks to people. As some of the water bodies in the area serve as drinking water for families and farm animals, the potential health risks can not be over emphasized and should definitely not be over looked.

4.4.3 Housing

Looking at the effects of the mining activities on housing in the study area was another concern of this research during the fieldwork, because the quality of the houses people live in is an indication of their quality of life. A conscious effort was therefore made to observe at first hand, the quality of housing in the area, and to sample views on the subject. Most respondents agreed that some miners had been able to use their earnings from the ASM sector to put up housing facilities for their families. They however agued that this is not a very common phenomenon since most of the indigenes do not earn that much, to be able to take care of their families and save to build houses. One respondent had this to say:

[24] This is beyond the scope of the present research and could be made an integral part on further research on the ASM in the communities.

I started to build a new 'block house'[25] for my family about five years ago, but I have not been able to complete it. Back then I used to make a lot of money from my mining activities, but I have been unfortunate in recent times. These days my income has reduced a lot because I am no longer able to find much gold and the agents who come to buy our gold like to pay lower prices. In addition to all these, my financial obligations have increased as I now have two children in Senior High School.

Another respondent held that:

I used to work in Kintampo[26] as a farm labourer when the mining activities were started in this community. I was initially reluctant to return, but when my younger brother was able to build a new house for his family from the money he made by working in the mining activities, I said to myself that it was time for me to return home and also work in these ASM activities and to be with my family. Since my return however, I have not been able to make enough savings to build my own house, but I have made some modest earnings, and should add that I very am happy I returned home.

The experience of the two above respondents is a clear illustration of the vulnerabilities faced by the miners in the Nangodi. Dependence on the amount of gold one is able to find from the mining activities means that, when less or no finds are made, the income of the one is badly affected. In addition, being dependent on agents (middlemen) also affects the income of the miners. The prices these middlemen are able to pay are themselves determined by how much profits they can make when they trade the gold to the gold purchasing companies in the big cities, and ultimately by world market prices, which as we have already observed are unstable. The first respondent started work on his new 'block house' five years back at a time he used to get a lot of gold from his mining activities and the prices were good. He has had to put a hold on his building project because he is no longer able to find as much gold, and the price he is able to get from the

[25] This is a house constructed from bricks made from cement. Traditional houses are made from mortar from the earth (soil).
[26] Kintampo is a farming district in the Brong Ahafo Region of Ghana.

middlemen is much reduced. The second respondent was encouraged to give up his work in Kintampo and return home by the success of his brother. On his return however, he has not been able to replicate his brother's success. These vulnerabilities faced by the miners do not allow them to adequately plan for the future. This can negatively affect the long term development of the area.

It emerged from the focus group discussion that it was mostly the non-indigenes who made enough savings from the sector to build houses, but they do this in their own home towns, since they do not plan to stay in the study area for prolong periods. Most of the non-indigenes interviewed, admitted that they had been able to upgrade their houses or to finance new ones in their home towns. Here again we see an element of 'internal colonialism', as the non-indigenes uses their dominance to squeeze the revenues from the ASM sector in these rural communities (Lippi 1977). This robs the community not only of the opportunity to benefit from the investments in housing from the income from the ASM sector, but also of the opportunity to stimulate local employment for people who will construct the houses and demand for local raw materials. The bigger cities, where most of the non-indigenes come from are the main beneficiaries in this case. This not withstanding, the few houses constructed in the mining communities do stimulate some employment and demand for local materials. On the subject of housing, all respondents agreed that though ASM had made only modest contributions, they did not think the sector had in any way negatively affected it.

4.4.4 Gender Relations

In many developing countries, women play a major role in the ASM sector. In Guinea, for example, women are said to account for as much as 75% of the ASM workforce (MMSD Final Report 2002). In Ghana, Hilson and Potter have estimated that, about half of those employed in the ASM sector are women (2003 cited in Tschakert and Singha 2007). The ASM sector employs women in most of its operations, except in the handling of mechanized equipment, which is itself limited in the ASM sector. Women are also indirectly involved in the ASM sector through the provision of such ancillary activities as the supply of food, drinks, prostitution, tools and equipment, as well as trading in gold and gemstones.

Almost in direct contrast to Hilson and Potter's assertion, this study found that in Nangodi only about a quarter of those employed by the ASM sector are women. All respondents in the interviews and focus group discussions agreed that they are many more men involved in the mining activities in the area than women[27]. This view was also confirmed through personal observations. Some respondents agued that this might be the case because in this part of the country, women are required to stay at home as housewives to take care of children and other household chores. They also maintained that most of the women engaged in the mining activities work with or for their husbands.

The participation of women in the ASM activities in Nangodi can be appreciated by taking a look at their participation in the various stages of the mining process. A close examination of the various stages of the mining process and the roles shows a kind of division of labour between women and men. In the initial stage of prospecting, women play almost no part. This appears to be the case because in contrast to their men counterparts, some of who have obtained some experience from the major mines in Southern Ghana, the women lack the necessary expertise and experience to be able to determine where gold ores might be deposited. Women who want to work independently may have to rely on their male counterparts to help in pointing out to them where the gold ores are likely to be located. The exorbitant fees the women have to pay for such services limit most women to work with or for the men.

In the stage of digging, that is where the gold ores are located below the surface of the earth, women are not involved. Where however, the ores are found on the surface, women can be involved in gathering the gold bearing stones. Women are then mostly charged with carrying the gold bearing stones to a convenient place for further processing.

After the ore bearing stones have been transported to the processing site. They are broken down in to powdered form (by manually pounding them with a metal mortar). It was obvious from observations and confirmed by most respondents that women are not involved in this stage, because of the excessive physical nature of the task. At this stage however, women are responsible for fetching water for the soaking and washing of the

[27] Respondents however gave different proportions of women engaged in the sector, though most respondents agreed the figure is much closer to 25%.

ore. Women are also involved in the sieving (shanking)[28] the ore from the unwanted rock particles. When the ore is ready for sale, women are major players in trading it. This they do on behalf of their male counterparts. Most respondents confirmed that this is the case because the women are more skilled at bargaining for better prices, since most of them have long been involved in trading of goods and foodstuffs in the local markets.

One area where women dominate in the ASM activities in Nangodi is in support services offered for the miners. Such support services include the sale of provisions, the running of 'chop bars' and drinking bars. The situation in Nangodi is similar to that found by Boateng(1996) in his research in the Upper East Region of Ghana; he revealed that most women in mining in the region are often restricted to trading, providing water for sale, cooking for sale and human prostitution. The dominance of men in the mining sector reinforces the income and power gap between women and men in the study area. The table below shows a significant income difference between women and men engaged in mining in Nangodi.

Table 4.3 Monthly income (in GH Cedis) difference between women and men in mining.

Gender	Minimum Income	Average Income	Maximum Income	Number
Women (miners)	260	265	310	3
Men (Miners)	223	420	520	9

Source: Fieldwork 2010

4.4.5 Effects on Migration

The ASM sector fuels migration in many developing countries. The ASM sector attracts many people in rural areas of the developing world to relocate, either temporarily or permanently in an attempt to improve their livelihoods. In Ghana, the mining sector is

[28] This refers to the art of separating the ore from the soil particles.

said to have attracted people from neighboring countries as Nigeria and Burkina Faso and countries as far north as Mali, Niger and Chad (Nyame et al. 2009). Within Ghana itself, the ASM sector has been a 'pull factor' in getting many people to relocate to mining areas in search for better employment opportunities, incomes, and other economic opportunities and services that the sector promises. The many retrenchments that were forced in the large-scale mining sector and other economic sectors in Ghana as a result of the economic slow down in the 1980s, led to the movement of many of these retrenched skilled and semi-skilled workers to areas with mining potential to engage in ASM activities (Hilson and Potter 2005 cited in Nyame et al. 2009).

The resurgence of mining activities in Nangodi coincided with these retrenchments. It was however in the early 1990s that the area became a popular destination for many miners around the country. Respondents maintained the 1990s saw the highest influx of people to the area. Many people from both within the Upper East Region and other parts of the country moved to the area to either participate directly in the mining activities or to reap some of the wealth created by and around the sector, by providing practitioners with support services.

The influx of many people to the study area poses a number of problems (economic, social and cultural) for the area. Some of the common problems respondents cited include an acute shortage of housing and other social services, rampant increases in food prices and general inflation, and the increase of such social vices as alcoholism and drunkenness, robbery, promiscuity and prostitution. Many respondents were particularly critical of the role of non-indigenes in these vices. They argued that most of these vices were unheard of in the area until the arrival of the non-indigenes. They however admitted that some youth of the area have been lured into some of these vices by the promise of making 'quick money'.

It also emerged from the interviews that the mining activities in the area has reduced the out-migration of the youth of the area to other parts of the country, which used to be the common practice prior to the introduction of ASM activities.[29] Most respondents held that since the mining activities offer them jobs and others opportunities

[29] This is the practice in most communities in Northern Ghana, especially during the long dry season. Southern Ghana has two raining seasons and is therefore able to provide employment opportunities to these youth at a time when there is very little to do in Northern Ghana.

to earn a decent living, there is no longer the need to travel to other places. This ensures that the ambled bodied youth are able to remain in the area to contribute to its development. Encouraging the youth to remain in the area to take up jobs in the ASM sector, benefits the local economy as a whole. For instance during the raining season, when majority of the miners are unable to continue with their mining activities because of the flooding of their shafts, many of them go back to farming (and other economic activities), and these benefit from the increased labour.

Respondents also claimed that many indigenes of the area who had been forced, in the past, to move out to seek 'greener pastures' in other places, especially in the forest region of Southern Ghana have been encouraged by the mining activities to come back home. Three respondents in the focus group discussion admitted to having been encouraged to come back home by the new opportunities provided by the mining activities. Five others said at least one member of their family had returned home. Only one respondent from the miners interviewed admitted to having been attracted to come back to the area by the ASM activities. A respondent in the focus group discussion who had only recently returned to home to the area, after many years in the South had this to say:

> *I used to be a 'loading boy' in Kumasi, loading and off-loading people's goods from the market trucks. The work was very difficult and the pay, small (not good). At night, I slept under the big trucks since I could not afford to rent my own room (accommodation). In fact life was very difficult. I decided to come back home and see if working with these galamsey[30] people will be better for me.*

The attraction of both indigenes and non-indigenes to (come back home to) the area has led to a significant increase in the area's population. In addition to the problems cited above, the increased population has also stimulated increased economic activities. There is increased demand for locally produced goods and services. There are many small/brisk businesses mushrooming in the area, and the local 'market day[31]' sees many people from surrounding villages and towns coming to do business with the local people.

[30] 'Galamsey' is a term used to refer to illegal gold miners in Ghana
[31] Nangodi has a three day market cycle

4.5 Environmental Effects

As observed earlier, it is commonly argued that the ASM sector is 'dirty and fundamentally unsustainable' because the sector is more costly in environmental terms per unit of output as compared to medium, large and modern mining operations (Akabzaa and Darimani 2001, Hentschel et al. 2002). The MMSD final Report (2002) cites some of the common environmental impacts of ASM to include mercury pollution, cyanide pollution, direct dumping of tailings and effluents into rivers, threats from improperly constructed tailings dams, river damage in alluvial areas, river siltation, soil erosion and deforestation and landscape destruction. The Report concludes that it is these and other factors that have prompted some people to call for a total ban of ASM activities. People engaged in ASM activities tend to lack basic awareness and knowledge of better methods to reduce the impacts of their activities on the environment. It is also argued that, as compared to large-scale miners, operators of the ASM sector have little or no initiative to go about their activities in a more environmentally friendly manner since their activities are mainly for subsistence and is intended to meet immediate needs. Below is a look at some of the environmental effects of the ASM activities in Nangodi.

4.5.1 Land and Vegetation Degradation

Mining invariably requires the disturbance of the land, so that the underlying mineral deposits can be exploited. Mining therefore has the potential to lead to the deterioration of the quality of the land and the landscape in general. In many instances, the clearing of substantial amounts of vegetation precedes the actual mining process so that the vegetative cover is also adversely affected. In a research; 'A Study of the Takwa Mining Region', in Ghana, Akabzaa and Darimani(2001) found that mining activities in the Takwa region has resulted in chemical pollution, and the degradation of land and vegetation. They found that significant tracts of land and vegetation have been cleared in the region to make way for mining activities. In addition to the erosion which such clearings lead to, they also found that the mining activities in the area have led to the destruction of the luxuriant vegetation, biodiversity and cultural sites.

During the fieldwork, it was found that except in a very few instances where the gold ores are found on the surface, miners in the area mostly have to dig in order to reach

the gold bearing rocks (ores). Respondents admitted that such digging leads to a lot of adverse consequences for the local landscape and the already sparse vegetative cover. Digging loosens up the soil structure making it susceptible to erosion when the torrential rains arrival. Though respondents maintained that they are required to refill the pits after their mining activities, as observed earlier, most miners do not obey this requirement. Even when attempts are made to refill the pits, the lack of the right equipments and the general lack of interest on the part of the miners mean that this is so badly done that the reclaimed land is only a shadow of its former self. Below is a picture of an abandoned mining site, where attempts have been made to refill the pit with soil particles and rocks. As can be observed, this was so badly done that the land is no longer suitable for any plant life. The trees seen have theirs roots so exposed that they are likely to soon fall over.

Figure 4.7: A bad attempt at reclaiming lands after mining activities
Source: Fieldwork 2010

The loss of vegetation was a major concern for many respondents. As we have observed in Chapter One, the rearing of animals is a major component of agriculture in Nangodi. Most households here keep farm animals like goats, sheep, donkeys and cattle for

economic, social and cultural purposes. The loss of vegetation threatens these farm animals as these rely on the grasslands for feeding. The indiscriminate destruction of the vegetation by the activities of the miners means that there is less and less grasslands to feed these farm animals. A respondent claimed that:

> *These days it is very difficult to find any grass to feed our animals. Most of the grasslands have been cleared for mining activities. We frequently have to take our animals far into the bush so they can find enough grass to feed on. In the dry season when the animals are on free-range, some of them go far away from our homes to feed and are not able to find their way back home, or are even stolen.*

Land and vegetation degradation brought about in Nangodi by the activities of the miners directly impacts on agricultural productivity as most of the land which have been used for mining purposes are no longer suitable to support plant life.

4.5.2 Water Pollution

Water bodies are another of source of worry for people concerned with the activities of ASM operators. With regard to water pollution, Akabzaa and Daramani (2001) observed four main problems in the Tarkwa region; the chemical pollution of ground water and streams, siltation through increased sediment load, increased faecal matter and dewatering effects. Cyanide and mercury used in ore processing are said to constitute a major source of pollution to underground and surface water. Other studies in Tarkwa have shown that gold mining operations have resulted in significant localized surface water, atmospheric arsenic and ground water pollution. Arsenic concentrations in most groundwater is said to be in excess of WHO guidelines maximum for drinking water (10 µg/L). (Smedley 1996, Balfors et al 2007, Tschakert and Singha 2007). These are a major threat affecting the quality of drinking water for both humans and animals and ultimately their health.

It emerged from the field study that the pollution of streams and rivers is a particular concern in the area. Most respondents claimed that this result from the dumping of chemicals, accidental spillages, or simply from large amounts of soil and solid matter being dumped into the water bodies. The pollution of these water bodies can

affect the livelihoods of people who depend on them for drinking water and for fishing. Some respondents also argued that not only is the quality of water in the streams and rivers affected, but also the very quantity of water available in them is also affected. One respondent asserted that:

> *The activities of the miners are causing our rivers to dry up. They use up so much of the water in washing their gold. The broken particles they throw about, all over the place also end up in the rivers causing them to dry up. These days the water in the rivers look brown because of so much suspended particles in them. Even our animals do not want to drink from them, how much we human beings.*

After pounding the ore at various places, the broken down materials are sometimes taken to ponds or rivers, for washing. This poses a grave danger to the inhabitants of the area, as the mercury and other chemicals used in processing the ore are likely to pollute these water bodies. During the focus group discussion, it was found that this practice of washing the ore in the water bodies has been banned, but a few unscrupulous people still do sometimes sneak there to wash their stones. This, respondents admitted has been limited to a very large extent.

Though direct washing in the ponds and streams has been checked, it was observed that the washing of the ore in waterways, and on some river banks can contaminate the water bodies. These contaminants might remain there until the rains come and wash them into the water bodies. Most of the respondents maintained that they get their domestic water from 'stand pipes'; and as such chances of their domestic water being contaminated are very slim. Not the same can however be said of all the communities downstream. Some of these communities, respondents admitted still depend on the streams for domestic purposes. Some respondents also said they have been concerned of their livestock been affected by the contaminated ponds and streams, as these go to the ponds and streams to get their drinking water.

4.6 Interaction and Effects between Mining and the three dimension of Sustainable Development in Nangodi

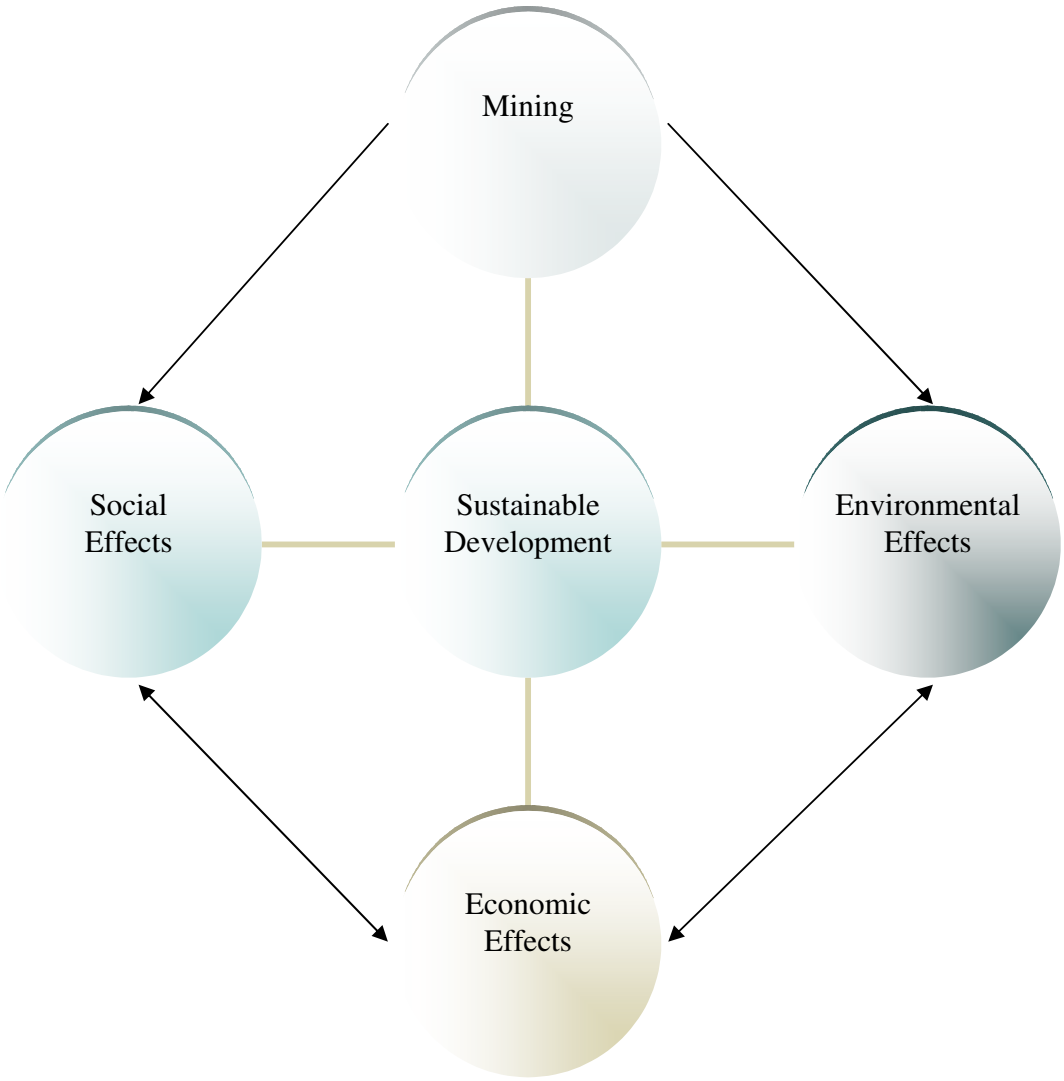

Figure 4.8 Interaction between ASM and the three dimension of Sustainable Development; Here defined as a total concept regarding human and nature

Source: Fieldwork 2010

Economic effects, social effects and environmental effects brought about the ASM activities in Nangodi do not happen in isolation. Rather there are interactions and further effects between the various components involved in all three main areas of effects and

ultimately, on sustainable development. Economic effects in terms of employment opportunities, income increases and improvements in agriculture and other sectors of the local economy directly affect the social lives of the people as well as their environment. An improvement in employment opportunities and income for instance has a direct bearing on the ability of the people to send their children to school. More income for the adult population means that fewer children will be required to work to supplement the income of their parents. More children will therefore be able to stay and concentrate in school, so that they can be prepared on how best 'to meet their own future needs'. In addition, the quality of housing and health will also benefit from an increase in employment opportunities and income. The local environment is also positioned to be affected by the improvement in employment opportunities and income levels. As more people find gainful employment and their incomes levels are improved, they will depend less on the environment for their survival. For instance the people can then afford to use liquefied petroleum gas (LPG) for domestic purposes instead of firewood and charcoal. The local environment will then benefit from the shift away from the use of firewood and charcoal for cooking, leading to its sustainability in the long term.

Social changes and effects brought about by the ASM activities also affect both the economic lives of the inhabitants and their environment. Improvements or otherwise in education and health are bound to affect employment and income levels. If the communities are able to take advantage of the mining activities to improve education, then more people will acquire the necessary training and skills to enable them seek for employment opportunities in other sectors of both the local and national economies. Education will also ensure that the people become conscious of pollution and degradation of their environment. They will also learn better ways of going about their activities without unnecessarily compromising the ability of the environment to support plant life and the aspirations and needs of future generations.

The effects of the mining activities on the local environment also affect both the economic and social lives of the inhabitants of the area. Environmental effects ultimately affect the economic prospects of people in the area. Land and vegetation degradation makes agriculture difficult and less productive. The drying up and contamination of the area's water bodies also affects the health of the people and their farm animals.

The next section discusses some of the challenges that confront the mining sector in Nangodi.

4.7 Challenges to ASM contributing to improved Livelihoods and Sustainable Development in Nangodi

Some of the common challenges attested to by miners and observed by this research include economic (financial) challenges, challenges to other economic sectors, education/child labor challenges, environmental, health and safety challenges, gender challenges and legal recognition challenges. Below is a discussion of these challenges.

4.7.1 Economic (Financial) Challenges

Many respondents in the interviews and focus group discussion attested to the fact the ASM sector in the study area is challenged by economic (financial) limitations. This is said to result from the inability of miners to raise loans from the banks or to make any substantial savings of their own. The banks tend to be very reluctant to extend loans to these operators because in most cases they do not have any collateral with which to guarantee any loans the banks may offer them.

The inability of miners here to raise funds from the banks affects their ability to acquire the requisite machines to help in locating the gold ores, reaching and processing the ores. Respondents complained that the lack of machines to detect where exactly the ores are located means that more often than not they exert a lot of energy, time and money going on wild goose chases. One particular concern to many of the miners as seen earlier, was the fact that during the raining season they are unable to continue with their mining activities because the mining pits become flooded. The incomes and improved lives achieved through the ASM sector are therefore not sustained all year round.

To enable the ASM sector in Nangodi to realize its potential of contributing to reducing poverty and improving the lives of the people, Government could acquire these machines and give them to the miners on friendlier terms. Government and the local authorities could also encourage the miners to come together to form unions. In this way they would be more viable and credit worthy so that they can have access to loans from financial institutions. Empowering the indigenes to take a major role in the mining

activities will go a long way to improving their earnings from the sector in the short run, and in the long term the increased earnings could then encourage savings and investments into other economic activities. The other economic activities that benefit from such investments could then support the miners and the entire community when the gold ores are depleted.

Another challenge that affects the potential of the ASM to contribute to the development of Nangodi involves the vulnerabilities faced by the miners as regards their income levels. In addition to the fact that the miners are not able to carry out their mining activities all year round as discussed above, the prices of gold are set by middlemen (agents) and ultimately by world market prices, which we have already observed to be unstable. The miners are vulnerable to sharp falls and changes in the prices for their gold. To protect these miners from such vulnerabilities, government could establish a parallel Board to the Ghana Cocoa Board, which would be charged with buying gold from the miners at a fair and fixed price. This will not only ensure that the miners are protected from the frequent changes in world market prices, but it will also eliminate middlemen and thus protect the miners from exploitation by these middlemen. This will ensure that the miners receive a fair and fixed income from their activities. All things being equal, they will therefore be better positioned to save, reinvest, plan and contribute more effectively to the sustained and sustainable development of the area in the long term.

4.7.2 Challenges to other Economic Sectors

As this study has seen, other sectors of the rural economy, most especially agriculture are affected; both positively and negatively, by the mining activities. Mining makes use of both land and labour resources, and would often come into conflict with other sectors that require these factors of production for their development. Common complains among the small-farmers included the destructions of their farmlands by the digging activities of the miners, chemically infested farmlands and the attraction away of labour from the farms. These, they claimed have led to dwindling yields.

Training the miners on proper mining techniques and use of chemicals as well as ensuring that they follow a strict mining code would go a long way to mitigate the negative effects of the mining activities on agriculture and other sector of the rural

economy. In addition, efforts should also be made to integrate the ASM sector into the local community. This can be achieved by encouraging beneficiaries to reinvest their profits into other economic activities and services.

Recent initiatives to reconcile the ASM as an income generating activity for both individuals and communities and to contribute to rural poverty reduction, have promoted community development programs that run parallel and may eventually replace the sector as a livelihood strategy (Mime 2002 cited in Tschakert 2009). In Ghana such initiatives have included programs as the promotion of mushroom and snail farming, fish farming palm oil production, batik making, grasscutter rearing among others. Extending such programs to Nangodi and other mining communities in Northern Ghana would make the growth such communities achieve from their participation in the ASM sector sustained and sustainable in the long term, as these programs could serve as livelihood strategies for these communities when the minerals eventually run out, and for future generations.

4.7.3 Educational/Child Labour Challenge

Another challenge faced by rural communities in their quest to use the ASM sector to achieve an improved standard of living and sustainable development is the use of children in the sector. This as we have seen in Nangodi, negatively affects the education of the children concerned, as it has a direct bearing on school enrolment and attendance. The use of children as workforce in the ASM sector first came to light in the 1990s, following press reports of child labor in coal mines in Colombia. Though child labour is illegal in most countries and the International Labour Office classifies working in mines as one of the 'Worst Forms of Child Labour', many children continue to be used in the ASM sector in many developing countries (MMSD Final Report 2002).

As observed above[32], education is one area that has been affected by the mining activities in Nangodi. Some school children are compelled to participate in the mining activities for diverse reasons (see reasons in Nangodi above under Effects on Education). Though the ASM activities do help to promote education in Nangodi through helping parents to financially support their children through school, in another guise, the participation of children in the ASM activities negatively affects their education as it

[32]Under Effects on Education/Child Labor

impedes their school attendance and ability to learn. In addition, allowing young children to work, or even help in the mines, constitute child labour and impedes their growth and development, and also unnecessarily exposes them to dangers and hazardous conditions way beyond what they can cope with.

Compromising the education of the future generation means that they are less equipped with the requisite attitudes, skills and knowledge to meet future challenges. So that no matter how beneficial the mining activities may be to the study area today, it may in the long term prove to more of a curse than a blessing. Education has been identified as one area in which resource sectors as ASM can make a contribution to sustainable development in the long term. Since gold is a finite resources and is sure to run out at some point, the Nangodi community as a whole needs to make a conscious effort to take advantage of the profits from the ASM sector to ensure that the area, and its future generations will be adequately equipped (educated) to continue to provide for its (their future) needs when mining is no more.

In an effort to ensure that children in mining and other poor communities in Ghana do stay in school, the Government of Ghana introduced the Free Compulsory Basic Education programme (FCUBE). The aim of which is to get all parents to enroll their children in school instead of sending them out to work. This policy has clearly not been implemented in full in Nangodi, since children are still able to work in the ASM sector instead of staying in school. To make sure that FCUBE meets its aims, it will also be important that government, the local authorities and mining authorities get tough with parents in the area who allow their children to work in the mine and with miners who employ child labour in their operations.

4.7.4 Environmental, Health and Safety Challenges

Environmental health and safety challenges are another problem the ASM sector is frequently faced with. Millions of people in the Developing World in their quest for survival in the mines and elsewhere pay little heed to the effects of their activities on the environment, their health and on their safety, which has negative implications for their economic and social well being. The International Labour Office (ILO) cites the five major health risk in small-scale mining and processing to include exposure to dust

(silicosis), exposure to mercury and other chemicals, effects of noise and vibration, effects of poor ventilation (heat, humidity, and lack of oxygen), and effects of over-exertion, inadequate work space and inappropriate equipments (Jennings 1999, cited in Hentschel et al. 2002). The ILO also cites rock falls (subsidies), lack of ventilation, misuse of explosives, lack of knowledge (lack of training and violation of regulations) and obsolete and poorly maintained equipment as the five most frequent causes of accidents in small-scale mining

The ASM sector in Ghana is also challenged by safety issues. There are frequent reports in the Ghanaian media of varying degrees of accidents in the ASM sector. In the month of June (2010) alone, two tragic accidents were reported. The first was at Dunkwa-on-Offin in the Central Region where at least 20 miners were trapped to death in a collapsed mining pit[33] , and the second , coming barely two weeks after, occurred at Attaso in the Ashanti Region, where at least 12 galamsey operators were said to said to have been trapped to death in another collapsed pit[34].

In Nangodi, environmental and health challenges in the mining sector are manifested in diverse forms; some of these include river and water pollution, land degradation and destruction of the local vegetation. These adversely affect health status; which as we observed earlier could also affect income levels, and standard of living of the people, farming, endangers children and farm animals, and the general aesthetic value of the environment. It is the high costs of such effects that have prompted scholars like Hentschel el al. (2002) to argue that the ASM sector is fundamentally unsustainable, whilst Proponents of the Dutch Disease have argued that the sector is more of a curse that a blessing to local communities (Auty 1993, Ulrich, 2007).

Since most of the environmental and health challenges in the study area (and other places in Ghana where ASM activities are practiced) seems to result from the lack of the proper equipments and regulations or the disregard for such regulations, it will be important for government and the District Assembly to help the miners to acquire the appropriate tools, and to put in place a kind of training regime to periodically train the miners on how to go about their mining activities without unnecessary putting their health

[33] http://news.myjoyonline.com/news/201007/48544.asp
[34] http://news.myjoyonline.com/news/201007/49297.asp

and environment at risk. The Minerals Commission and the local authorities could also go round the mining sites periodically to ensure that miners abide by the laid down regulations. These would go a long way go to reduce the high environmental and health cost of the ASM activities in the area, and enable it to contribute to improving the quality of the lives of the people and to the sustainable development of the area in the long term.

4.7.5 Gender Challenges

Yet another challenge to the mining sector in contributing to the economic and social development in Nangodi is the gender challenge. As observed earlier, women here play a rather subdued role in the ASM activities. This does not augur well for the lives of households and the development of the area. The involvement of women in ASM activities is said to have a direct bearing on family revenues and the better control and management of those resources. Research has shown that women are more likely to spend their income on family maintenance than their men counterparts, who can easily be tempted to spend their incomes on such things as alcohol, gambling and prostitutes (Hentschel et al. 2002).

In Nangodi, and other parts of Northern Ghana where polygamy is practiced, and the number of wives and children a man has determines his status in society, the fashion is for men who have made money to take more wives and have more children to boast their social standing. This means that the immediate family might benefit less from the new found wealth. In addition to the above, women are more likely to spend the money they make from their participation in the ASM sector on the education of their children and to invest in other economic activities, which can help to improve the lives of their households, and the development of the entire community. The limited participation of women in the mining activities in the area would therefore not appear to be a good omen for households since income accruing to men may have a lesser impact on their well-being. Also as started earlier, most of the women engaged in mining activities in Nangodi work with or for their husbands, in such instances, it is the husbands who has control and management over revenues realized.

The challenge is therefore to empower women at all levels of the ASM productions in the area, and ensure that they have a fair share of the incomes resulting

from their work and have a greater control of their own finances. It is however important that women not be allowed to participate in certain stages of the mining process which may expose them to chemical substances that could pose a health risk to unborn babies or breast feeding babies.

4.7.6 Legal Recognition Challenge

Legal recognition is yet another challenge that the ASM sector faces in contributing to sustained and sustainable rural development. To get government to play an active role in the control and management of the ASM sector, it will be important that the activities of the ASM operators become recognized and formalized into the regular economy. In this way, government could then get actively involved in the activities of ASM operators and to attend to some of the challenges facing the sector discussed above, without risking being accused of flouting its own laws.

As we have seen in chapter two, in many developing countries artisanal and small-scale miners operate in the informal sector that is they are not given any legal recognition[35]. By recognizing the sector and by establishing the means by which the miners can operate legally, all parties can benefit; the miners can be assisted to get a fair and less vulnerable price for their gold, and the government can boost its revenue from taxation. Hancock & Needham (1996) have observed that the Zimbabwean government has increased its revenue by around $80 million per year by legalizing small-scale mining operations (cited in Simpson 1999).

Recognition and participation of the ASM sector in the formal sector are central to making the sector sustainable and flourishing. Young and Frazer for instance have identified the lack of recognition as harmful and constraining the potential of the sector to contributing to a sustainable livelihood for those engaged in it, as it prevents them from participating in decision making processes(cited in Tschakert 2009).

For the purpose of effective policy, the above will require the establishment of long term partnerships that values the knowledge of the different stakeholders in the ASM sector, participatory schemes for environmental monitoring, and a political commitment to make unused concession lands available to artisanal and small-scale

[35] See reasons for this in chapter two under large-scale verses small-scale mining.

miners through a simplified process of registration. This will ensure that the miners are able to gain access to knowledge on good environmental practices, and the authorities can make frequent inspections on their practices. The Practices of good environmental policies could then be used as a pre-requisite for renewing licenses or for obtaining assistance (as loans) from the state and other avenues.

Though the illegal miners in Nangodi are never faced with the threat of sanctions for operating outside the legal framework, legally recognizing them will put them in good stead to apply for financial assistance from banks and other financial institution, since they will then be able to document and show that they are engaged in a viable and legal venture. In addition, the miners here will also be able to benefit from assistance and training from the state.

4.8 Summary

This chapter has presented the data collected during the field work in Nangodi. The data has been so presented under a number of themes (and sub themes): economic effects, socials effects and environmental effects, to help paint a picture of the effects of the mining activities in the area on the lives of the people and the economic and social development of the area as a whole.

The chapter also attempted to analyze and discuss the challenges that confront the mining sector in the study area. Some of the challenges that were identified and discussed included; economic (financial) challenges, environmental, health and safety challenges, education/child labour challenges, gender challenges, challenges to other sectors of the economy and legal recognition challenges. These challenges places limits on the ability of the people of the area to use the mining activities to improve their standard on living. The chapter discussed how these challenges can be managed so that the communities concerned will be able to make the most of their participation in the mining activities in improving their lives and preparing the grounds for life after mining.

CHAPTER FIVE

Research Findings and Conclusions

5.0 Introduction

This study has been necessitated by questions over the real impact of Artisanal and Small-scale Mining (ASM) activities on the economic and social development of rural communities. It sought to examine how ASM activities in Nangodi, have affected the lives of the people of the area and its economic and social development. The data obtained has been organized and analyzed in an attempt to answer the above objectives of the study. An underlying assumption in the study has been that the mining activities have negatively affected the economic and social development of the area. This hypothesis has been tested by examining the impact of the mining activities on income levels, employment, agriculture (and other sectors of the rural economy), education, health, housing, migration and the local environment. In this concluding chapter the research findings are summarized and conclusions to the study made.

5.1 Summary of Research Findings

The findings, presented below, meet the aims and objectives of the research. The study found that the impact of ASM activities on the economic and social development of Nangodi has been one of a mixed blessing, producing both positive effects and negative effects on the lives of the people of the area.

(1) Positive effects: The following economic and social parameters has seen improvement as a direct (and indirect) result of the mining activities in Nangodi;

(a) Employment: The research has shown that employment as a whole has seen improvement as a result of the mining activities in the area. The ASM activities provide *direct employment* for many of the area's youth. The people of the area also benefits from seasonal employment, in that during the long dry season, when little agricultural activity is possible, they are able to participate in the mining activities. The mining activities also provide indirect employment in terms of support services to the miners. Mining has thus become an important source of livelihood to many of the area's population.

(b) Income: Income levels have also been shown to have increased as a result of the mining activities in the area. Incomes per month for people engaged in the mining activities are much higher than those engaged in small-farming. The higher incomes of the miners are however not fixed because of volatility in the price of gold and the role of middlemen (agents). This affects their ability to plan and invest their profits from the sector, affecting the prospects of the sector to make a contribution to the sustained and sustainable development of the area.

(c) Migration: The mining activities in the area have stemmed the rate of out migration of the area's youth to other parts of the country to seek for employment opportunities and greener pastures. In addition, these activities have also attracted many indigenes of the area, who had earlier been forced to seek 'greener pastures' in other places to return home to take up jobs in the sector. Many non indigenes have also been attracted to the area to participate in the mining activities. These in-migrations have led to a growth in the area's population, stimulating increased economic activity.

(d) Agriculture and other sectors of the rural economy have benefited from the resultant population increase. The miners and other people attracted to the area have led to an increased market for agricultural produce and other locally produced goods and services.

(e) Education: The mining activities have also aided the education of some children and youth of the area, in that some people are able to sponsor the education of their children with the profits they realize from the participation in the mining activities. Some children are also able to take up menial jobs in the sector to enable them pay for, or to assist their parents to pay their school fees, and to buy school uniforms and books.

(2) Negative effects; the mining activities has negatively affected;

(a) The Agricultural sector: Agriculture, which is the major employer and life-wire of the rural economy, has been negatively affected by the mining activities. In addition to losing land and labour directly to the mining activities, agricultural production is affected by the chemical infestation and the destruction of

farmlands by the careless and unscrupulous practices of some miners. In addition to the above, the area has been unable to take advantage of the profits from the ASM sector to improve agriculture in terms of mechanization and skills for small-farmers.

(b) Health: With regards to health, the study found that the mining activities have resulted in some health concerns in Nangodi. The mining activities results in such infections as river blindness, tuberculosis, cholera, pneumonia, malaria and upper respiratory track infections. The incidence of such diseases coupled with the ignorance on the part of many of the area's miners on the effects of the mining activities on their health poses a serious challenge to their health and that of other people in the community.

(c) Education/Child Labour: Despite some positive effects of the mining activities on education as discussed above, the participation of many children in the mining activities constitute child labour and in addition to affecting the growth and development of the children concerned, also greatly impedes their performance and concentration in school. This will negatively affect the long term sustainable development of the area because the children are denied the opportunity to acquire a good and sound education/training to be able to cater for 'their needs in future'.

(d) Indigenes participation: The research has also shown that *the majority of people involved in the mining activities in Nangodi are non-indigenes*. It emerged that only about a third of the miners in the area are indigenes, whilst the majority originate from other places. The limited participation of indigenes and the dominance of non-indigenes in the mining activities does not augur well for the economic and social development of the area, because most of the non-indigenes transfer the profits they make form the sector out of the area to spend or to invest, thereby denying the area of the opportunity to benefit from stimulated economic activities.

(e) Gender relations: The research also found that there are more men involved in the mining activities than women. Women in the mining activities are limited to

subsidiary roles and the provision of support services to their men counterparts. This further widens the income and power gap between women and men.

(f) Environmental effects: The mining activities were also seen to have taken a heavy toll on the area's environment. Environmental challenges resulting from the mining activities in Nangodi include land degradation, destruction of the vegetative cover, river and water pollution, and dust pollution. The mining activities in the area normally involve the clearing of substantial amounts of the vegetative cover and digging which leads to the destruction of the land. The rivers and water bodies in the area are also affected by the dumping of chemicals, accidental spillages, and from the large amounts of soil and other solid matter being dumped into them. These affect the quality and quantity of water in these water sources. These environmental effects have numerous adverse effects for agricultural production, the health of the people and the long term sustainable development of the area.

(3) Finally, this study found that the various effects resulting from the mining activities in Nangodi; economic effects, social effects and environmental effects, do not happen in isolation. Rather there are interactions and effects between the various components involved in all three main areas of effects and ultimately, on the sustainable development of the area.

5.2 Conclusion

The first conclusion drawn from this research is that the mining activities in Nangodi have had both positive and negative effects on the lives of the people and the area's economic and social development. Employment opportunities and income levels have witnessed some improvements, whereas education, heath, agricultural productivity and gender relations have been adversely affected by the mining activities in the area.

Secondly, the mining activities have negatively impacted on the local environment. River pollution, vegetation destruction and land degradation have all been exacerbated by the activities of the miners. These have direct implication on agricultural production, the health of the people, and the sustainable development of the area.

Thirdly, there are more non-indigenes involved in the mining activities in the Nangodi, than indigenes. The non-indigenes have also been found to reap the bulk of the profits accruing from the sector. This does not only negatively affect the economic and social development of the area, but is unfair since the negative economic, social, and environmental effects caused by the activities of the miners will be borne mainly by the indigenes, and its is the ability of their 'future generations to meet their own needs' that will be compromised after the miners are long gone.

Finally, gender relations have deteriorated as a result of the mining activities. Women benefit least from the mining activities, because they are mainly involved in subsidiary roles. This has further widened the economic and power gap between women and men. This is not good for the development of the area since income of women have been found to have a better effect on the lives of households and the development of the communities.

These economic, social and environmental effects brought about by the ASM activities have numerous implications for both the short and long term development of Nangodi. The people of the area might benefit from improved income levels and employment opportunities in the short term, but these positive effects have led to very limited spread effects to other sectors of the rural economy. The inability of these positive effects to stimulate spread effects means that such positive effects have been offset by the numerous negative economic, social and environmental effects stemming from the mining activities. ASM has thus failed to contribute to the long term sustainable development of the area, for as Simpson (1999; 3) has argued "sustainability in mining means making the best use of a (mineral) resource to…ensure that the area containing the resource will be fit to support other livelihood sustaining activities when mining is history". This study therefore supports the hypothesis that the mining activities in Nangodi have negatively affected the lives of the people of the area and its economic and social development.

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APPENDICES

Appendix 1: Semi-Structured Interview Guide

This questionnaire is strictly confidential. Any information given will only be used for academic purposes.

Section A. General Background

Date of interview……Age…….Sex……Level of education…….Marital status…….

Section B. Economic Background

1) Are you employed? If No, why?
a. If yes, what do you do?
b. Are you engaged in or have you ever been engaged in any other economic activity?
c. Have you tried in the past to get another kind of employment or would you prefer to have a different employment?
d. How much income do you earn in a month?
e. Are you the only person who earns income in your family? If no, who else earns income and what do they do?

Section C. Effects of Mining Activities

1) What do you think are the effects of the mining activities on the following in Nangodi:
    a. Income levels
    b. Employment
    c. Education (Do children work in the mining activities)
    d. Agriculture and other economic activities
    e. Health (safe in the mines)

f. Housing
g. d. Migration
h. Gender relations
i. The local environment

Section D: The role of Non-indigenes in the mining activities

1) Where do the non-indigenes come from?
2) What do you think is the role of non-indigenes in the mining activities?
3) What is the relative proportion of indigenes and non-indigenes in the mining activities? and why?
4) Who earns the most from the mining activities, indigenes or non-indigenes? and why?

Section E: The Role of Women in the Mining Activities

1) What do you think is the role of women in the mining activities in Nangodi?
2) What is the relative proportion of women and men in the mining activities? and Why?
3) Who earns the most from the mining activities, women or men? and Why

Appendix 2

P.N.D.C.L.218

SMALL-SCALE GOLD MINING ACT, 1989

ARRANGEMENT OF SECTIONS

Registration and Licensing of Small-scale Gold Miners

SECTION
1. Licensing of small-scale gold mining.
2. Qualifications of applicant for a licence.
3. Conditions for the grant of a licence.
4. Duration of a licence.
5. Areas covered by a licence.
6. Revocation of a licence.
7. Licence not transferable.
8. District centres and their functions.
9. Registration of prospective licensees.
10. Small-scale gold mining committees.

Operations of Small-scale Gold Miners

11. Operations of small-scale gold miners.
12. Compensation for use of land.
13. Use of explosives prohibited.
14. . Purchase of mercury.
15. Exemptions from income tax and royalties.

Miscellaneous Provisions

16. Licence to buy and deal in gold.
17. Sale of gold.
18. Sale of jewellery.
19. Offences and penalties.
20. Regulations.
21. Interpretation.

P.N.D.C.L.218

SMALL-SCALE GOLD MINING ACT, 19891

AN ACT to provide for the licensing of small-scale gold mining operations and for related matters.

I. This Act was issued as the Small-scale Gold Mining Law, 1989 (P.N.D.C.L. 218) made on the 19th day of April, 1989 and notified in the *Gazette* on 2nd June, 1989.

(5) A person who does an act in contravention of a provision of subsection (I) commits an offence and is liable on summary conviction to a fine not exceeding two hundred and fifty penalty units or to a term of imprisonment not exceeding twelve months or to both the fine and the imprisonment.

(6) Subject to subsection (I), an importer may import the seeds of a crop for the purposes of seed production for export if at the time of importation of the seed the importer makes a declaration in triplicate to the Commissioner, Customs, Excise and Preventive Service or an officer authorised by the Commissioner stating

(a) that the seeds are for the personal use of that person,

(b) that the seeds are to be used for experimental purposes only,

(c) that the seeds produced from the imported seeds shall not be sold to a person in the Republic, and

(d) that the production, distribution and disposal of the seeds shall be as authorised by the Minister.

(7) An importer who knowingly makes a declaration which is false commits an offence and is liable on summary conviction to a fine not exceeding two hundred penalty units or to a term of imprisonment not exceeding six months or to both the fine and the imprisonment.

(8) The Commissioner, Customs, Excise and Preventive Service shall forward two copies of the declaration to the Chief Seed Multiplication Officer.

2. Inspectors

(I) The Minister may designate a qualified person to act as an inspector for the purposes of enforcing this Act.

(2) An inspector may, for a purpose mentioned in subsection (I), at a reasonable time, on the production of the certificate of appointment,

(a) enter a place where the inspector has reasonable grounds to believe that there are seeds to which this Act applies; or

(b) inspect the seeds found in that place and take samples of the seeds; or

(c) require a person in possession of a document in respect of seeds to which this Act applies to produce the document for examination or for the purposes of obtaining copies or extracts from the document; or

(d) request a person to furnish an information which the inspector may require for the purposes of this Act.

3. Obstruction of inspectors

A person who

(a) obstructs an inspector exercising powers under this Act, or

(b) fails to comply with a request made in the exercise of a power under the Act, or

(c) gives an information which that person knows to be false,

commits an offence and is liable on summary conviction to a fine not exceeding two hundred and fifty penalty units or to a term of imprisonment not exceeding twelve months or to both the fine and the imprisonment.

4. Seizure of seeds or package

(I) An inspector may seize a seed or a package in respect of which an offence is committed under this Act.

(2) A seed or a package seized under subsection (1) shall be retained by the inspector, but

(a) if proceedings are not commenced against the person from whom the seed or package was seized within six months of the seizure, the seed or package shall be restored to that person, or

(b) if that person is convicted of an offence under this Act, the seed or package shall be forfeited by the Court before which that person was convicted.

(3) A seed or a package forfeited by the Court under subsection (2) *(b)* shall be delivered as soon as practicable to the Chief Seed Multiplication Officer who may dispose of the seed or package.

5. Analysts

For the purposes of this Act, the Minister may appoint a qualified person as an analyst who shall examine seeds or samples of seeds which an inspector may refer to the analyst.

6. Certificate of analyst

A certificate duly signed by an analyst stating that the analyst has examined seeds or the samples of seeds referred to the analyst by an inspector and stating the results of the examination is prima facie evidence of the facts contained in the certificate.

7. Offences by bodies of persons

(1) Where an offence under this Act is committed by a body of persons then,

(a) in the case of a body corporate other than a partnership, every director, secretary or similar officer of the body corporate shall be deemed to have committed that offence;

(b) in the case of a partnership, every partner or officer of the partnership shall be deemed to have committed that offence.

(2) A person shall not be convicted of an offence under subsection (I) if it is proved that the offence was committed without the knowledge or connivance of, and that due diligence to prevent the commission of the offence was exercised by, that person having regard to the circumstances.

8. Regulations

The Minister may, by legislative instrument, make Regulations

(a) establishing a national seed committee and prescribing the functions of the committee;

10. Small-scale gold mining committees

(I) There shall be established in every designated area a small-scale gold mining committee.

(2) The committee shall consist of

(a) the district secretary or the representative of the district secretary who shall be the chairman,

(b) the officer-in-charge of the district centre,

(c) one representative of the town development and planning committee of the district, and

(d) *omitted* [5]

(3) The committee shall assist the district centre to effectively monitor, promote and develop small-scale gold mining operations in the designated area.

(4) The members of the committee shall hold office for the periods and on the terms and conditions determined by the Minister.

Operations of Small-scale Gold Miners

11. Operations of small-scale gold miners

A person licensed to mine gold under this Act may win, mine and produce gold by an effective and efficient method and shall in the operations observe good mining practices, health and safety rules. and pay due regard to the protection of the environment.

12. Compensation for use of land

Where a licence is granted in a designated area to a person other than the owner of the land, the licensee shall pay to the owner of the land the compensation for the use of the land that the Minister may in consultation with the Minerals Commission and the Lands Valuation Board determine.

13. Use of explosives prohibited

A small-scale gold miner shall not use explosives in the operations of that mine.

14. Purchase of mercury

A small-scale gold miner may purchase from an authorised mercury dealer quantities of mercury reasonably necessary for the purposes of the mining operations.

15. Exemptions from income tax and royalties

For a period of three years from the date of the coming into force of this Act, persons engaged in small-scale gold mining operations shall be exempted from the payment of income tax and royalties in respect of those mining operations.

5. The Committee for the Defense of the Revolution does not now exist, and thus the reference to two of its representatives is omitted.

Miscellaneous Provisions

16. Licence to buy and deal in gold

Without prejudice to an enactment empowering a person or body to purchase and deal in gold the Minister may in consultation with the Minerals Commission in writing, license a person the Minister considers fit, to buy and deal in the types and forms of gold, and under the terms and conditions specified in the licence.

17. Sale of gold

(I) A licensed small-scale gold miner or a person in possession of gold may sell the gold in the possession of that miner or person to an authorised buyer only.

(2) A person shall be presumed to be lawfully in possession of gold until the contrary is proved.

18. Sale of jewellery

This Act or any other enactment shall not be construed as precluding a person from dealing with or disposing of the gold jewellery, gold artefact or gold coin of that person to an authorised dealer or to any other person.

19. Offences and penalties

(I) A person who buys or sells gold without a licence granted under this Act or without a valid authority granted under an enactment commits an offence and is liable on conviction to a fine not exceeding two hundred and fifty penalty units or to a term of imprisonment not exceeding five years or to both the fine and the imprisonment.

(2) A person who

(a) without a licence granted by the Minister undertakes a small-scale gold mining operation contrary to subsection (1) of section I, or

(b) acts in contravention of any other provision of this Act in respect of which an offence has not been prescribed,

commits an offence and is liable on conviction to a fine not exceeding one hundred penalty units or to a term of imprisonment not exceeding two years or to both the fine and the imprisonment.

(3) A Court before which a person is convicted under this Act may in addition to the penalty that it may impose order the forfeiture to the Republic of the gold or other mineral in respect of which the offence was committed.

(4) Where an alien is convicted of an offence under this Act the alien is liable after paying the fine or serving the imprisonment imposed to deportation under the Immigration Act, 2000 (Act 573).

20. Regulations

The Minister may on the advice of the Minerals Commission and the chief inspector of mines make Regulations for the effective implementation of this Act.

21. Interpretation

In this Act, unless the context otherwise requires,

"authorised buyer" means a person authorised by the Minister to buy gold;

"citizen" has the same meaning as provided in section 84 (1) of the Minerals and Mining Act, 1986 [6] other than a public corporation;

"committee" means a small-scale gold mining committee established under section 10;

"designated area" means an area designated as a small-scale mineral operation area by the Minister by a notice published in the *Gazette;*

"district centre" means the centre established by the Minerals Commission under section 8;

"gold" means gold dust, gold bullion, retorted gold, gold, ore gold amalgam, gold alloy, precipitates containing gold, slag, concentrates, tailings and residue containing gold;

"licensed small-scale gold miners" means a person licensed under this Act to win and mine gold;

"Minister" means the Minister responsible for Lands and Natural Resources;

"prescribed" means prescribed by or under the Act or by or under the Regulations; "Regulations" means Regulations made under this Act;

"small-scale gold mining operations" means the mining of gold by a method not involving substantial expenditure by an individual or group of persons not exceeding nine in number or by a co-operative society made up of ten or more persons.

6. P.N.D.C.L. 153.