

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI

COLLEGE OF ENGINEERING

DEPARTMENT OF MATERIALS ENGINEERING

**THE EXISTENCE OF THE CHIRANO GOLD MINE LIMITED AND ITS
EFFECT ON THE LIVELIHOOD OF THE CHIRANO CONCESSION AREA**

By

Eric Darko

June, 2012

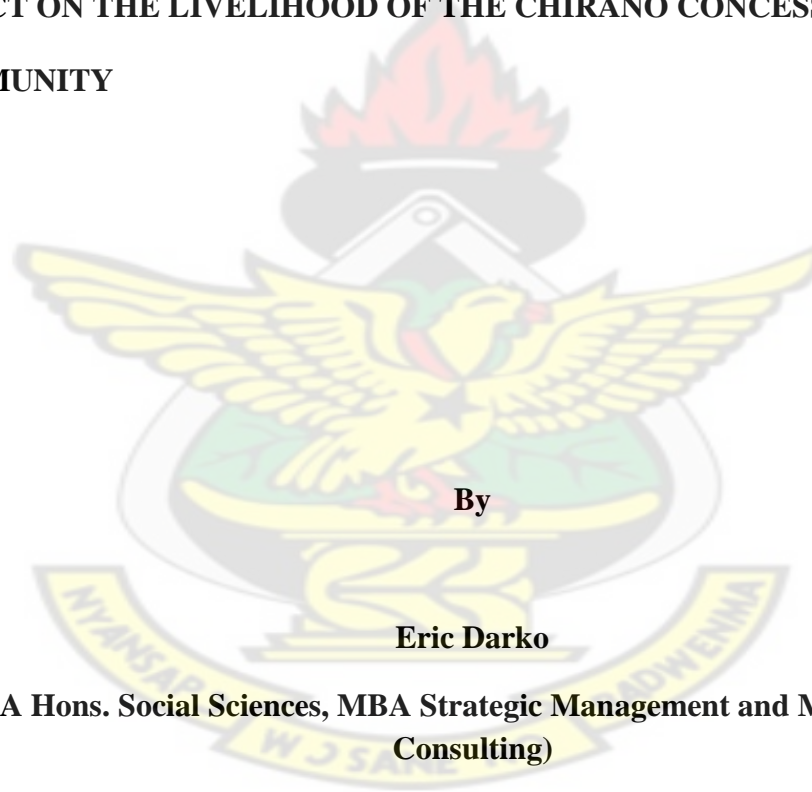


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EFFECT ON THE LIVELIHOOD OF THE CHIRANO CONCESSION
COMMUNITY**



By

Eric Darko

**(BA Hons. Social Sciences, MBA Strategic Management and Management
Consulting)**

June, 2012

A thesis submitted to the Department of Materials Engineering of the College of Engineering, in partial fulfilment of the requirements for the degree of Master of Science, in Environmental Resources Management.

DECLARATION

I hereby declare that the submission is my own work towards the award of MSc. Environmental Resources Management and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any degree of the University, except where due acknowledgement has been made in the text.

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ABSTRACT

Ghana is endowed with rich mineral resources e. g. gold, diamond, manganese and bauxite. Mining of minerals has triggered agitation by communities, who expect improved livelihoods from the mining companies. This study aimed at assessing the effect of the existence of the Chirano Gold mine Limited (CGML) on communities in its concessional area (Etwebo, Akoti and Paboase). Quantitative and qualitative primary data on general household characteristics e. g. employment, food security, health care, and sustainable utilization of natural resources were collected via questionnaire, interviews and personal observations. One hundred and fifty (150) respondents were drawn from traditional rulers, district assembly, land owners, farmers, youth groups, opinion leaders and women. The Statistical Package for Social Scientists was used to analyze the data for percentages, ranges and central tendencies. Results indicated that majority (98.2%) of respondents have obtained both direct and indirect employments (through stimulus for infrastructural development) from CGML. Thirty two (32%) of the respondents expressed worry about lose and degradation of farms, farm lands and farm roads while 93% cited the problem of air pollution. Sixty-four (64%) respondents have not been educated beyond the Junior High School. This placed restrictions on the extent of employment for members of the communities who on the contrary have not fully appreciated this limitation. There appears also to be a wide communication gap between CGML and the communities. This has masked the company's image weakening its mutual co-existence with the communities. Adoption of more open communication and operational policies and stakeholder inclusion in local interventionary measures could help improve the relationship between company and the communities for co-existence.

DEDICATION

I dedicate this thesis to my ever supportive and loving family especially my wife, Mrs. Goddana Darko for her support in diverse ways towards a successful completion of my MSc. Degree programme at the College of Engineering of the Kwame Nkrumah University of Science and Technology, Kumasi. This thesis is also dedicated to all those who believe in the richness of learning.



ACKNOWLEDGEMENT

I specially thank God Almighty for bringing me this far. I also acknowledge my supervisor, Mr. G. Owusu-Boateng. I say a very big thanks for your immense support and direction right from the beginning of this study to its completion.

Finally, my heartfelt thanks go to my friends and colleagues who, in various ways, contributed to the successful completion of this work.

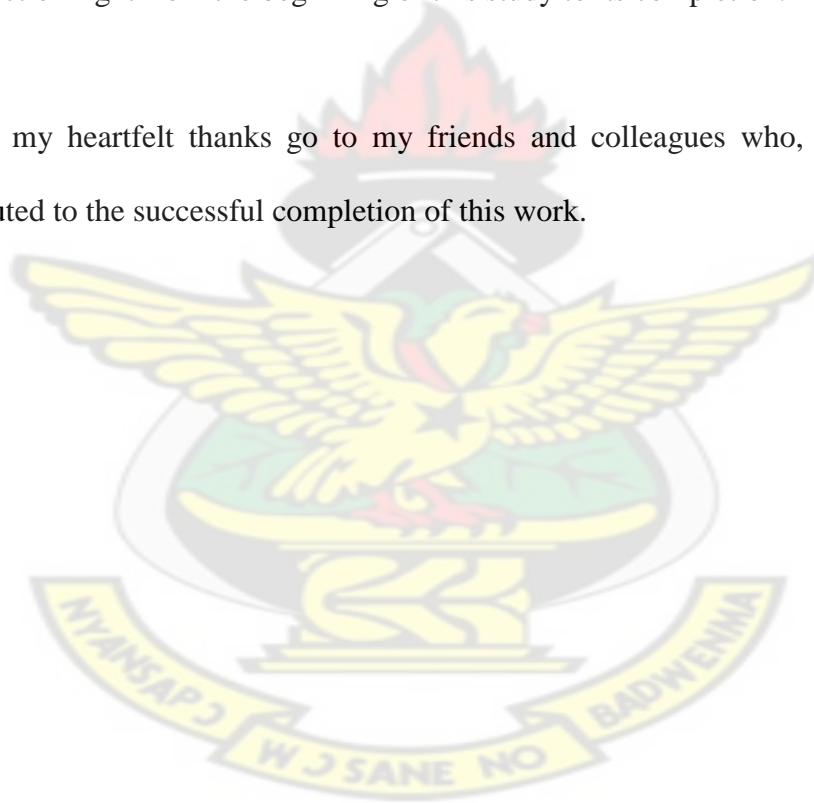


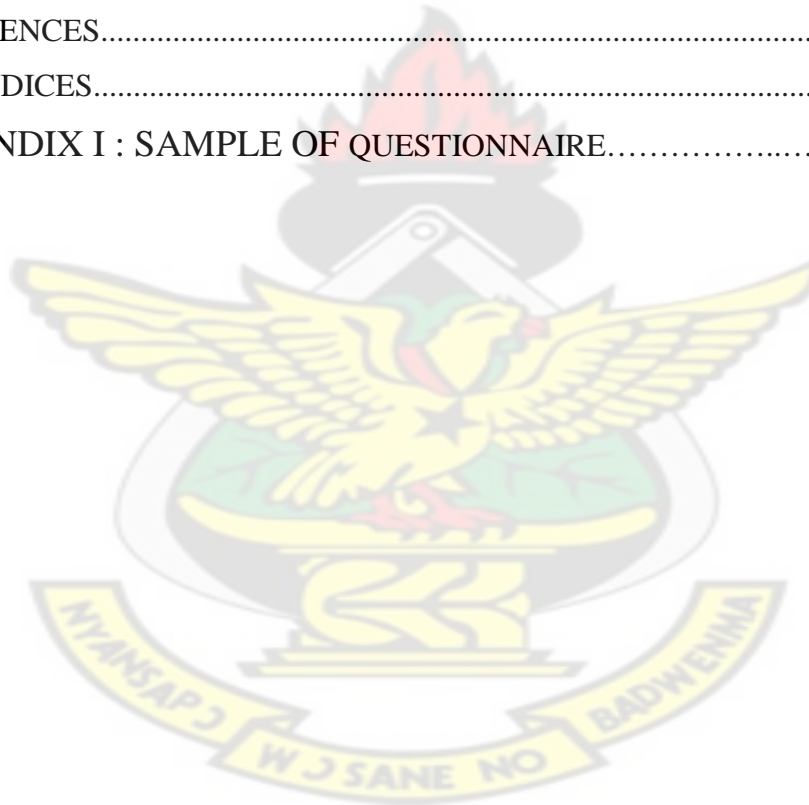
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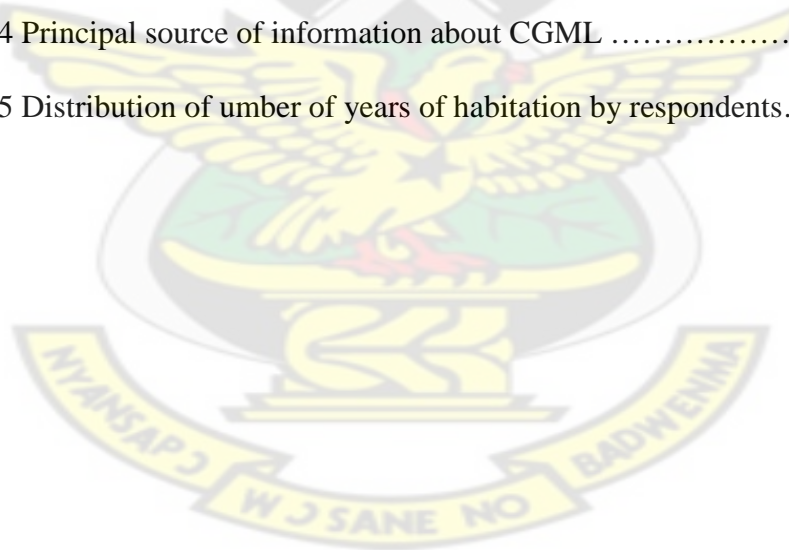
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CHAPTER ONE

INTRODUCTION

1.1 Background

The quest for greater economic growth and development has necessitated in recent years, that nation's intensify their effort in exploring and harnessing all kinds of environmental resources (Cunningham C. Siago 2001). According to Goudie (2006), mining activities such as excavation and ore exploration have some potential impacts on the environment as well as the socio-economic life of the community. It is acclaimed all over the world that land has been man's main source of sustenance. That is from the soil and from what is under the soil come particularly all the materials on which human beings depend (Sharp and Engholm 1940). Land can therefore be put to various uses based on what is in or on the soil and what is under the soil. The various means by which land has served as man's main source of sustenance include agriculture, extracting materials from or under the soil such as fishing, lumbering, quarrying and mining among others.

Ghana is endowed with rich and valuable mineral resources such as gold, diamond, Bauxite, manganese and oil. According to the Extractive Industries Transparency Initiative, the mineral deposits still in the ground provide a strong endowment to build a dynamic and robust economy. About 20% of the country is under mineral concessions and up to 70% in specific regions (Resource Water Agents, edition 2, October 2009). Gold is the most common mineral mined in commercial quantities in Ghana. The

exploration of some of these minerals in general and gold in particular would be traced to the colonial era (www. minelinks.com 15-01-2010). Ghana has a long history especially for gold mining. Gold from West Africa and for that matter Ghana was exploited and trade to Europe at least as early as the tenth century. The exploitation was based mainly on native workings and numerous gold deposits. The Precambrian auriferous Tarkwa conglomerates of Ghana were developed in a modern way during the period 1876-1882 by Pierre Bonnat, the father of modern gold mining in the Gold Coast (Ghana) in 1885, Ashanti Goldfields Company now Anglo Gold Ashanti began work in Obuasi developing the Ashanti and other mines which have produced large proportion of gold since 1900.

Mining activities in Ghana for a very long time were concentrated in a few towns and communities such as Obuasi, Tarkwa, Awaso, Bogoso, Kade, Preastea and Nsuta among other towns. The extraction of gold in particular for a long time was done through the deep shaft or underground method. The Obuasi and Tarkwa mines are very good examples of this method. The underground method did not require the use of extensive land as most of the activities are concentrated in a relatively small area. In addition, the method did not pose much threat to the environment and for that matter the communities at the fringes of the mines in the form of pollution of all forms.

The gold mine at Obuasi for instance was established in 1898. This means mining operations have been going on in Obuasi and for that matter the country for more than one century (100 years).

As a result of the Structural Adjustment Programme (SAP) adopted in the 1980s by Ghana, many developing countries of which Ghana is no exception have experienced an increase in resource extraction activities by multilateral corporations. The gold sub-sector has correlatively attracted the bulk of the total Foreign Direct Investment (FDI) inflows into the country since the reforms were instituted in 1983. The growth or increase in mining activities has also been attributed largely to Ghana's adoption of the most liberal mining regulation regimes in minerals endowed developing countries. The resultant effect of this is that mining activities are being undertaken in areas which were traditionally noted for other economic activities particularly agriculture. Some of the affected communities are Amansie in the Ashanti Region, Kenyasi in the Brong Ahafo Region and Chirano in the Western Region. The increased participation of foreign mining companies coupled with new technology of mining led to a paradigm shift from traditional underground method to surface mining. This made it possible for the recovery of shallow low grade surface deposits previously considered uneconomical resulting in an overall mining boom in the country.

Surface mining usually involves the removal of the vegetative cover of a relatively large area, scooping or removal of the top soil and the digging of holes to pave way for the mining operations. Surface mining unlike underground mining constitutes a serious threat to the environment and therefore the existence of the people living in such communities due mainly to degradation of the land and pollution of all forms. This is because the activities are carried out on the surface; dust and smoke are thus directly emitted into the atmosphere thereby polluting the air. In addition, waste materials from

the mining activities are washed into water bodies resulting in water pollution. The preparatory works carried out before the mining activities such as the removal of the vegetation and the top soil also degrade or destroy the vegetation and the top soil on which the people depend for survival.

1.2 Problem Statement

Article 36 (1) of the 1992 Republican constitution of Ghana rejoins' that the state takes "all necessary action to ensure the national economy is managed in such a manner as to maximize the rate of economic development and to secure the maximum welfare, freedom and happiness of every person in Ghana and to provide adequate means of livelihood and suitable employment and public assistance to the needy". It would be interesting to consider the lot of individuals in communities affected by mining vis-à-vis this constitutional provision.

Livelihood is a concept that has been extensively discussed among academic and development practitioners. It deals with a group of people, their resources and what they do with them to make or earn a living. Carney (1998) stated that livelihood comprises the capabilities assets (including both material and social resources) and activities required for a means of living. Ellis (2000) suggests a definition of livelihood as the activities, the assets and the access that jointly determine the living gained by an individual or household.

Before the introduction of mining activities by the Chirano Gold Mine Limited (CGML), in the Chirano area, the people depended on the land for the cultivation of both cash and food crops. The land therefore provided a means of support or subsistence to the people.

In addition, the people depended on the various water bodies as their sources of drinking water and for other household chores.

According to the local communities (both in and at the fringes of Chirano Gold Mining area) the introduction of the mining activities has deprived the people of their farm lands. This has rendered most of the people who were hitherto cultivating the land to earn a living land less as their lands have been lost to mining activities. They have thus expressed dismay since according to them they suffered and continue to suffer various degree of adverse effect of mining activities.

They perceive the CGML's existence in the area as having polluted their sources of water destroyed their land and many of them continue to suffer due to low and inadequate compensation packages paid to them. Concerns have also been raised about inadequate housing, youth unemployment, family disorganisation, school drop outs, prostitution and drug abuse associated with the mining boom.

Their grievances also extend to the issue of increasing influx of migrant workers into some of these communities resulting in higher rent payment, high food prices, development of slums and squatters and an increase in crime resulting in general state of insecurity in such communities.

This has the potential of encouraging disturbance of the peace not only in mining communities but in the country as a whole particularly in the wake of the recent discovery of crude oil in the commercial quantities in the country. The CGML, on the

other is of the view that it has done and continues to do its best in honouring its obligation to the communities as demanded by virtue of its existence in these communities.

1.3 Justification of the Study

There outcry due to the perceived negative impact of mining on the livelihood of the communities in which the CGML operates and the denials by the CGML is a disturbing phenomenon. It is a potential tension-heightener. However, there is the need for harmonious mutual co-existence between the company on one hand and the communities on the other hand. There is therefore the need to ascertain the effect of mining on the livelihoods of communities in the concessional area, benefits extended to the affected communities and identify incentive gaps (if any) to be bridged and also the necessary recommendations directed toward peaceful coexistence to be made.

Furthermore, it is envisaged that the findings and recommendation could help influence the Ghana governments' mineral and mining policy to make it more responsive to the needs and aspirations of people living in mining communities. The study is expected to come out with recommendations which when implemented will help promote a peaceful and cordial relationship between mining firms and the communities affected by mining.

1.4 Research Questions

The study sought to answer the following questions.

1. In what ways have mining activities affected the livelihood of the communities at the fringes of the Chirano Gold Mines Limited.
2. To what extend has the current arrangements and practices helped reduced the effects of mining on the people.

3. What measures can be put in place or adopted to minimize the effects of mining on the livelihood of communities affected by the Chirano Gold Mines Limited.
4. What role can the government play to ensure that there is peaceful co-existence between Chirano Gold Mines Limited and the neighbouring communities?

1.5 Aim and objective

Aim

The aim of the study is to assess the effectiveness of the livelihood improvement benefits extended by the Chirano Gold Mine Limited to the communities in the mining area.

Objectives

1. To identify ways by which the mining activities of the Chirano Gold Mine Limited have affected the livelihood of its fringe communities
2. To determine the effects of the Chirano Gold Mine Limited on farming in the Chirano Mine Communities.
3. To assess the challenges faced by the Chirano Gold Mine Limited in meeting the expectations of the people in its fringe communities.

1.6 Scope of the Study

The study covered the Paboase, Akoti and Etwebo communities which lie at the fringes of the Chirano Gold Mines Limited. In terms of content, the study focused on various outcomes of livelihood namely income, food security and the sustainable use of natural resources. It embraced all stakeholders in the communities, particularly traditional rulers, landowners, farmers, youth, opinion leaders and women.

CHAPTER TWO

LITERATURE REVIEW

2.1 The Policies of the Environmental Protection Agency (EPA)

The formulation of environmental policies in Ghana was intended to redefine the functions of EPA as a regulatory institution with legal powers to ensure compliance and enforcement of environmental quality standards. Unfortunately, this has not been practical for most mining operations for a very long time due to the inadequate institutional capacity of the agency, the lack of coordination among mining sector institutions and the weaknesses of the Environmental Impact Assessment (EIA) process. These weaknesses such as inadequate capacity of EPA, lack coordination among mining sector institutions and inadequate EIA have provided the leeway for mining operations to have negative severe impact on the environment, deepening the plight and poverty of the people and affecting their overall wellbeing.

2.1.1 The Evolution of Environmental Regulations – 1983-1999

The ERP/SAP was launched in 1983 with the main objective of restructuring sectors of the economy to achieve an accelerated annual growth rate of at least 5%. This led to a number of economic and mineral policy reforms. However, while the mining sector reforms were going on, very little was done to reform existing environmental laws to accommodate the destruction that would arise from accelerated growth in the mining sector. In 1988, an attempt was made to quantify annual losses to the economy through environmental degradation. Conservative estimates amounted to 41.7 billion old Ghana

Cedis, the equivalent of 4 percent of total Gross Domestic Product (GDP). The following year, the Environmental Protection Council (EPC) began to apply the EIA as an environmental management tool and a pre-requisite to all development projects, especially of an industrial kind. However, the council lacked necessary legal backing to effectively enforce this requirement on industry, including mining.

2.1.2 The Evolution of Environmental Policies in Ghana - 1972 to 1982

In 1972, the United Nations General Assembly held a conference on the Human Environment in Stockholm, Sweden. Ghana participated in the conference, which agreed to give a human face to all type of development. As a commitment to the global efforts towards environmental protection and to give meaning to national effort at the environmental management, the Environmental Protection Council (EPC) was created in 1974 by NRCD 239. This was the beginning of the national recognition of the need to bring environmental issues into the stream main development.

However, this recognition and the creation of the EPC were propelled more by changes in the international scene towards environmental stewardship than by decisive national action to regulate its environmental resources especially mining activities. This is evidenced by the conspicuous absence from an 18-member Toxic Chemicals Committee appointed by the EPC to advise on such matters of any of the institutions that deal with mineral exploration. Decree 239 was primarily aimed at controlling the use of chemicals in the country. Even though the EPC was created in 1974; it remained an advisory body until 1994 when it became an agency with regulatory powers. It took a considerable

period of time to place the council under the appropriate ministry. The EPC began as a department under the Ministry of Finance and at one time, it was moved to the Ministry of Health and then to the Ministry of Food and Agriculture. The reshuffling continued until a full Ministry of Environment was created in 1992. This was later turned into the new Ministry of environment, science and Technology. These changes did not enhance on the strength and capacity of the Environmental Protection Council to protect the country's environmental resources from destruction by the mining industry in particular. There were also no provisions in the existing mineral laws to protect the environment from mining operations.

This process was given impetus by the preparation and adoption in 1991 of a National Environmental Action Plan (NEAP) and a National Environmental Policy (NEP). The NEP, which provided the broad framework for implementation of the NEAP sought to assess all undertakings including mining that might have a potentially adverse impact on the environment and to set and implement appropriate quality standards and guidelines for acceptable levels of public health and environmental safety.

2.2 Mining

Mining is the act of extracting ores or coal etc from the earth. It is the activity, occupation, and industry concerned with the extraction of minerals. The term may be used in its broadest context to encompass the extraction of any naturally occurring mineral substances namely: solid, liquid, and gas from the earth or other heavenly bodies for utilitarian purposes.

Mining, after agriculture has been the earliest humankind's endeavors. The two industries ranked together as the primary or basic industries of early civilization. They continue, is the beginning of civilization, to offer important benefits to society. Considering fishing and lumbering as part of agriculture and oil and gas production as part of mining, agriculture and mining continue to supply all the basic resources used by modern civilization. From prehistoric times to the present, mining has played an important part in human existence (Madigan, 1981).

As observed by (Akabzaa and Dramani, 2001), one major product of the NEP that addresses the environmental impact of the mining sector is the Mining and Environmental Guidelines, published in 1994 with the objective of assisting the mining industry to operate in an environmentally sustainable manner. The NEAP and NEP were given legal backing in December 1994 when the EPC was transformed into the Environmental Protection Agency (EPA) by an Act of Parliament (EPA Act, 1994(Act 490) Act 490 made EIA a mandatory requirement for all development projects and programmes, including mining. With the passage of Act 490, it became mandatory for all new mining projects to prepare EIA while existing mines were required to prepare and submit Environmental management Plans (EMP).

Procedures for the application of EIA to development projects and mining have been well developed and documented. Once in operation, the mines are obliged to prepare and submit their environmental action plans, annual environmental reports and environmental audit reports to EPA. This is to ensure periodic assessment of

environmental performance by all existing mines and to issue such directives as may be necessary for the timely intervention by the mines to address any environmental problems that might result from their operations. ACT 490 also gave rise to the passage of an Executive Instrument 9, 1999 and regulations to support issue specific areas under the Act and the NEP. One of the regulations is Legislative Instrument 1652, Environmental Assessment Regulations, 1999. The Executive Instrument 9, 1999 made provision for the appointment of certain categories of staff of EPA as public prosecutors in respect of offences committed under Act 490 and the pesticides control and management Act 528, 1996 while the legislative instrument provided standards for granting permit and licenses.

2.2.1 Impacts of mining

Akabzaa and Darimani (2001) observed that, in Ghana, mining (especially the gold sector) started making gains right from its inception. However the perception has been that there is lack of extension of commensurate benefits to the societies in which these mining activities occur.

Mining is characterized by the exhibition of both positive and negative impacts on both the environment and the on the communities in which the mining takes place and for that matter the country. Since mining projects are usually located in remote sites, mining companies have had to invest in considerable physical and social infrastructure such as roads, schools, hospitals, electricity and water supplies. Communities within locations have generally been beneficiaries of some of these facilities. At the same time, these communities have been victims of air and water pollution as well as other forms of

environmental degradation resulting from mining operations. Mining often requires a considerable degree of land alienation. Thus, while mining projects generally have weak links with the rest of a host national economy, they can have decisive impact on the communities in which or near which the mines are located (Anyemadu, 1992).

2.2.1.1 Positive impact of mining

There has been a general perception that the effect of mining on the mining communities and the environment is always negative. However, mining exerts positive impacts also which in some cases overrides the negative impacts. The positive impacts on the local communities include the following:

- Employment for the local people
- Provision of infrastructure e. g. schools, hospitals, boreholes, roads, markets centers, electricity, recreational centres and post office and educational scholarships to the local people.
- Provision of potable water and electricity

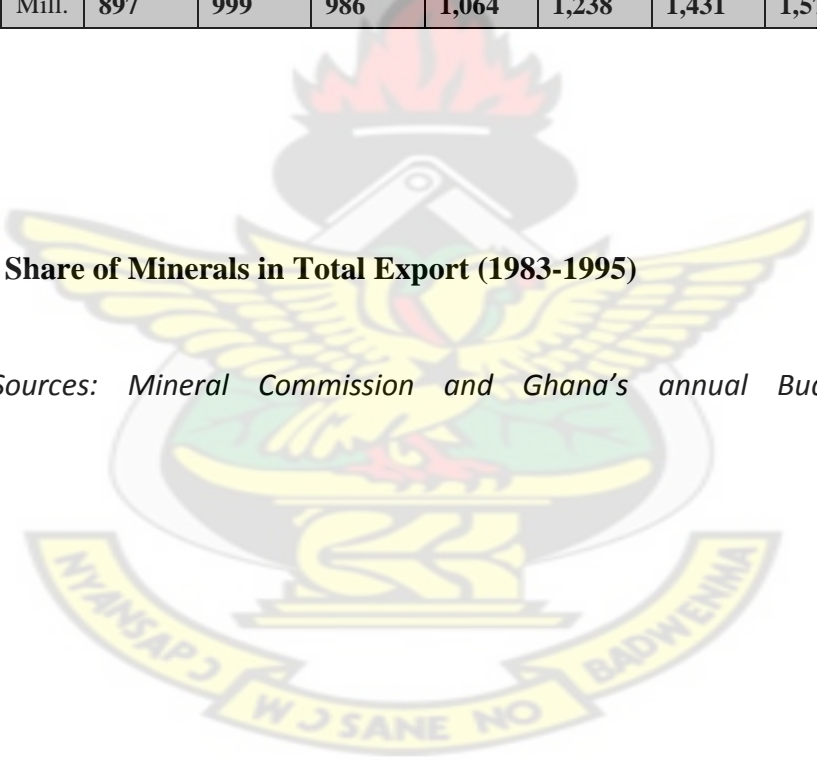
The most publicized benefits of the growing mining sector investment resulting from Ghana's economic reforms include the following:

- Increased foreign exchange for the country.
- Increased local government revenue
- Increased capital and social infrastructure to the public
- More direct and indirect employment.
- Development of communities in mining areas.

| EXPORTS | Unit | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|------------------------------|----------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Gold | US\$' Mill. | 201.60 | 304.40 | 343.40 | 434.00 | 548.60 | 647.30 | 612.40 | 579.23 | 687.76 |
| Diamonds | US\$' Mill. | 16.50 | 18.60 | 19.30 | 17.30 | 20.40 | 14.80 | 13.40 | 11.31 | 10.62 |
| Bauxite | US\$' Mill. | 10.00 | 8.60 | 9.50 | 8.40 | 9.60 | 10.40 | 8.40 | 10.79 | 7.37 |
| Manganese | US\$' Mill. | 14.20 | 20.20 | 16.50 | 13.90 | 9.60 | 6.40 | 7.10 | 11.55 | 12.06 |
| Total Mineral Exports | US\$' Mill. | 242.30 | 351.80 | 388.70 | 473.60 | 588.20 | 678.90 | 641.30 | 612.88 | 717.81 |
| TOTAL EXPORTS | US\$' Mill. | 897 | 999 | 986 | 1,064 | 1,238 | 1,431 | 1,571 | 1,490 | 2,091 |

Table 1 Share of Minerals in Total Export (1983-1995)

Sources: Mineral Commission and Ghana's annual Budget Statement



2.2.1.4 Generation of Government Revenues

The industry generates revenue for the internal economy through the following sources:

- Salaries, wages and other payments made to employees and contractors
- Corporate income taxes, royalties, concession rents, services, customs and harbor duties.
- Taxes on salaries of employees, and social security contributions from employees and their employers.
- Dividends to shareholders.
- Equipments and consumables purchase locally.
- Import duty and purchase tax on vehicles.
- Electricity and water charges.
- Divestiture of state mining companies and sale of government share.

Table 2 Contribution of the Mining Sector to Government Revenue

| Year | Income tax | Minerals Royalties | Total Revenue | Total Revenue | % from Mining |
|------|-------------|--------------------|---------------|---------------|---------------|
| 1990 | 2825941158 | 1893436000 | 4719377158 | 52818068300 | 8.94 |
| 1991 | 821844979 | 3021277000 | 3843121979 | 61485625496 | 6.25 |
| 1992 | 4555051883 | 4545804000 | 9100855883 | 74731531366 | 12.18 |
| 1993 | 4310958293 | 7485121000 | 11796079293 | 113236997000 | 10.42 |
| 1994 | 6942264876 | 12783689000 | 19725953873 | 16659594100 | 11.84 |
| | 19713191185 | 20911926000 | 40625117185 | 275513201000 | 14.75 |

Source: Adadey (1997) the role of the mining industry in the economy of Ghana.

Table 3 Divestiture proceeds from mines in study Area (in million of US dollars)

| Company | Purchase price | Amount paid | Balance | Investors |
|--------------------------------------|----------------|-------------|---------|--------------------|
| Tarkwa Goldfields | 3.0 | 3.0 | NIL | Goldfields & SSNIT |
| Prestea Goldfields | 2.0 | 2.0 | NIL | |
| Ghana National Manganese Corporation | 4.0 | 2.0 | 2.0 | |

Sources: Divestiture Implementation Committee

2.2.1.5 Generation of Employment

The mining sector is said to be a significant contributor to formal and informal employment in the country. In addition, mining sector support companies such as assay laboratories, equipment leasing and sales agencies, security and catering agencies also contribute to formal sector employment.

Table 4 Employment Statistics for Mines in Study Area

| Company | 1985 | 1990 | 1995 | 1996 | 1999 |
|---------|------|------|------|------|------|
| TGL | - | - | 941 | 1194 | 1413 |
| GAG | - | - | 536 | 586 | 680 |
| BBG | - | - | 1058 | 1025 | - |
| GGL | - | - | 1459 | - | 1138 |
| Barnex | - | - | 1580 | - | 1496 |
| Sankofa | - | - | 143 | 227 | - |
| AGL | - | - | - | - | 309 |
| SGL | - | - | - | - | 523 |
| GMC | - | - | 732 | 920 | 693 |

Source: Minerals Commission, Ghana

2.3 The Perceived Negative Impact on the Chirano Community

Mining has been associated with some unique features such as land use conflicts and abandoned mines natural background contamination associated with mineral deposits, industrial activities and contamination in the three-dimensional subsurface space, problem of long-term remediation after mine closure, problem of secondary contaminated areas around

mine sites. Local communities are affected negatively by the mining activities. Aubynn, (2003) observed the following social-related negative effects: unemployment, land dispute, adulteration of the culture, norms and values, higher cost of living, as well as environmental degradation through deforestation, erosion, pollution of water bodies, air and also sound pollution. The social organization of every community is guided and directed by certain norms, values, expectations and principles.

According to the Bibiani/Anhwiso/Bekwai District Planning Office Report (2008), the concentration of mining activities has triggered massive migration of many people to the area. The population growth rate is above the national average and might even be double the figure. The report added that apart from the mining and exploration companies, there has been a recent influx of other mining support companies such as contract miners, security organizations, catering and restaurant services, transport, explosives, equipment leasing groups, and road and building contractors.

Table 4 Mining Support Companies in Chirano

| COMPANY | ACTIVITY |
|-------------------------------------|--|
| African Mining Services | Contract mining |
| AFWEST Security | Security |
| MAXAM | Explosives |
| Kingdom Transport | Transportation |
| PW | Tailing Dam Construction and others |
| SGS Assay | Laboratory |
| ATS | Catering and Restaurants |
| ZacNarh | Equipment Leasing & Roads Construction |
| Transworld Assay | Laboratory |
| UEE | Explosives |
| WAMS | Equipment Leasing and Contract Mining |
| African Underground Mining Services | Underground Contract Mining |

Source: Researcher's Survey 2010

2.3.1 Prostitution

One of the major social issues that are perceived to have emerged from the concentration of mining activities in Chirano is prostitution. Over 70% of the communities contacted complained of the increase in prostitution and cited it as one of the factors responsible for the erosion of social values in the area. This has been confirmed by Care Project Report GHA018 (2000) that there are both mobile and resident sex workers in the area. The mobile sex- workers who came mainly from Takoradi, Kumasi, Cape coast, Accra and Obuasi target expatriate staff of the mining companies and some prosperous businessmen. The resident sex workers service mostly local workers of the large mines and the communities where they occur.

It is perceived that some of these sex workers had migrated into Chirano with the intention of trading or getting other jobs. Failure to attain their aspirations compels them to resort to prostitution as the last option for survival. The trend for reported cases of HIV in the Sefwi area has been on the increase since 2005.

Table 5: Reported HIV cases in the Bibiani/Anhwiaso/Bekwai and Sefwi Wiawso Districts 1992-1996

| Year | Reported HIV Cases |
|-------------|---------------------------|
| 1992 | 6 |
| 1993 | 25 |
| 1994 | 37 |
| 1995 | 68 |
| 1996 | 100 |

It is believed that the growing incidence of HIV cases in the Sefwi Wiawso and Bibiani-Anhwiaso Bekwai Districts, among the highest in the Western Region, is due to the increased incidence of sex trade in the area.

2.4 Perception of minerals from different perspective

Different people or writers refer to minerals differently depending on their interests and outlook. Minerals are naturally occurring homogeneous inorganic solid substance having a definite chemical composition and characteristics, crystalline structure colour and hardness.

Any of the following natural substances can be classified as a mineral:

- a. An element such as gold or silver
- b. An organic derivation such as coal or petroleum
- c. A substance such as sand, salt or coal that is extracted or obtained from ground or water and used in economic activities.
- d. A substance that is neither animal nor vegetable in organic matter.

An organic element such as calcium iron, potassium, sodium or Zinc that is essential to the nutrition of humans, animals and plants. It is also referred to as an ore ([http://www the free dictionary.com/mineral](http://www.thefreedictionary.com/mineral) 06/02/2010).

Mineral refers to a substance in solid or liquid form that occurs naturally in or on the earth, or on or under seabed, formed by or subject to geological process including industrial minerals but does not include petroleum as defined in the Petroleum Exploration and Production Law, 1984 (PNDCL 84) or water. Mineral is an inorganic species or substances occurring in nature, having a definite chemical composition and usually a distinct crystalline form. Rocks, except certain glassy igneous forms, are either simple minerals or aggregates of minerals (Webster Dictionary, 01 Mar 1998). Minerals occur in deposits. One of the commonest deposits is placer deposits.

2.5 Developments in Ghana Mineral Industry

Ghana's mining tradition, particularly regarding gold, dates back to the fifteenth century, with a rather ragged history. British and a few other foreign investors controlled the industry during the colonial period. Developments in industry at this stage were economic and political responses in Britain and Europe rather than to market conditions. The industry was very vibrant during the pre- independence period. Ghana accounted for 36% of total world gold output (8,153,426 fine ounces) between 1493 and 1600, but its share of world mineral output dwindled over subsequent years Tsikata (1997).

Tsikata (1997) further outlined that the post-independence period was marked by state ownership of mineral resources. The period up to 1986 was generally characterized by stagnation of the industry, except for a few spikes recorded immediately after independence and in the early 1970s. The sluggish production particularly in the gold sector could be attributed to market conditions, investor uncertainty about the safety of their investment under Ghana self-rule and the effects of state intervention in the industry. As part of the country's ERP in 1983, the mining sector underwent significant reforms beginning in 1986. This section looks at the dynamics and performance of the mineral industry in Ghana from the colonial era to date, exploring the local and global factors responsible for the evolution of the industry throughout the period.

2.5.1 Pre-Independence Period

According to Tsikata (1997), while gold mining by indigenous people is said to pre-date Christian times and Ghana's modern mining history spans over six centuries, private Ghanaian gold miners were banned after 1933 from operating mines due to the promulgation of the Mercury Law. British mining interests were a significant source of influence on the Colonial office in London and its representations in the territory and shaped the formulation and implementation of mineral policy in the colony. The thrust of the policy in the sector was aimed, first at establishing a legal and administrative framework that would facilitate mining operations and secondly, enduring the self-sufficiency of the British Empire. This was when other sources of bauxite were cut off from the Allied forces in the early part of World War II. Britain Aluminium Company Limited, Acting as agents for the British Ministry of Aircraft production started exploitation of the Awaso deposit. Similarly, exploitation of manganese in Ghana started in 1916 at the request of the Wartime Ministry of Mineral production during this period had its ups and downs. The period from 1480 to 1954 was characterized by 2 major periods of peak production (Jungle Booms) and 3 periods of depressed production, attributed to various reasons including the influence of two World Wars. Ghana accounted for 36% of total world gold output (8,153,424 fine ounces) between 1493 and 1600, but this share dwindled over the years as a result of new producers. Total production up to 1934 was about 30 million fine ounces of gold representing 2.7% of worldwide production (Bird, 1994).

The first and Second World War periods were characterized by low production according to Laura Irvine, Euro money, September 1991. Rapid closure of small and medium mines

starved of supplies because of the war, affected output. In addition, the drafting of men and miners who could handle explosives to the war front and the internment of German concessionaries by the British were some of the reasons accounting for the low production during the period. The depressed gold production in 1918-1929 was attributed to labour scarcity. The booming cocoa and construction industries and the emergence of the manganese and diamond mines affected the labour supply. But the growing number of Ghanaians who preferred to work in their small mines also affected the labour availability. In fact the preference of Ghanaians to work in their own mines rather than work for the Europeans encouraged the Colonial Office to pass the mercury Ordinance of 1930, making it illegal for Ghanaians to use mercury for mining. This marked the beginning of the criminalization of indigenous, small-scale gold mining and the edging out of Ghanaian gold producers, until 1989 when the small-scale Mining Law was enacted to give legal status to the sub-sector again.

The banning of indigenous gold mining did boost large-scale mining as more labour was freed for the latter and the period 1933 to 1942 saw increased mine output. The emergence of major new producing countries and the growing struggle for independence creating political risk and investor disquiet were responsible for the territory's dwindling share of world production from 1943 to 1954. State intervention immediately after independence was to ensure that mines with considerable labour force threatening closure did not do so for obvious reasons (Graham, 1982).

Table 6 Yield of Mineral in Ghana from 1925 - 1957

| Year | Gold (Ounces) | Diamond (Carats) | Bauxite (M/t) | Manganese M/t) |
|------|---------------|------------------|---------------|----------------|
| 1925 | 1925 | 210301 | 40296 | |
| 1926 | 1926 | 198083 | 185116 | |
| 1927 | 1927 | 189117 | 521774 | |
| 1928 | 1928 | 168933 | 594022 | |
| 1929 | 1929 | 167115 | 636779 | |
| 1930 | 1930 | 218494 | 777080 | |
| 1931 | 1931 | 246075 | 503743 | |
| 1932 | 1932 | 264442 | 872706 | |
| 1933 | 1933 | 284841 | 788704 | |
| 1934 | 1934 | 308960 | 844332 | |
| 1936 | 1935 | 337065 | 975151 | |
| 1937 | 1936 | 367819 | 971617 | |
| 1938 | 1937 | 461621 | 875248 | |
| 1940 | 1938 | 590026 | 944071 | |
| 1941 | 1939 | 701417 | 881373 | |
| 1942 | 1940 | 818911 | 814139 | |
| 1943 | 1941 | 882241 | 712476 | |
| 1944 | 1942 | 880000 | 719379 | |
| 1945 | 1943 | 721315 | 747712 | |
| 1946 | 1944 | 536727 | 722558 | |
| 1947 | 1945 | 527628 | 611080 | |
| 1948 | 1946 | 540906 | 495061 | |
| 1949 | 1947 | 604250 | 530319 | |
| 1950 | 1948 | 557185 | 620614 | |
| 1951 | 1949 | 882014 | 651067 | |
| 1952 | 1195 | 679173 | 386796 | |
| 1953 | 1951 | 694886 | 569392 | |
| 1954 | 1952 | 678831 | 800967 | |
| 1955 | 1953 | 700139 | 674743 | |
| 1956 | 1954 | 743630 | 789550 | |
| 1957 | 1955 | 787922 | 911973 | |

Source: Statistics for 1925- 83,. Kesse (1985), Mineral and Rock Resources of Ghana

2.5.2 The Post-Independence Period up to 1986

Generally, the vicissitudes in Ghana's mineral industry mirror trends in the global industry.

The period between 1965 and 1980 was also characterized by the declaration of permanent sovereignty over natural resources by developing countries, primary through large scale nationalization of mineral extractive facilities, the renegotiation of existing arrangements and

the creation of state enterprises and numerous commodity producer associations (Walde, 1983).

Ghana's mining industry was state-controlled from 1957 to 1986. After independence, the government set up the State Gold Mining Corporation (SGMC) and the Ghana National Manganese Marketing Corporation (GNMC). SGMC was established in 1961 to acquire five gold mines (Bibiani, Tarkwa, Prestea, Konongo and Dunkwa mines) from British companies. In 1972, the government took majority shares (55%) in Ashanti Goldfields Corporation, Ghana Bauxite Company and Ghana Consolidated Diamonds Company. The Ghana National Manganese Corporation took over manganese operations at Nsuta from the African Manganese Group, a British Subsidiary of Union Carbide. The Government's cardinal objective in the acquisition of these mines has been summarized as the protection of employment and the access to foreign currency generated by the mines. The policy at the time was, therefore aimed at maximizing government revenue, control of resources and employment generation. Thus state mines were subject to government intervention for purposes often unrelated to efficiency or economic probity. The sector was constrained by lack of investment and exploration. The state-owned mining enterprises were under-capitalised and become increasingly obsolescent and uncompetitive. Apart from AGC and GNMC, which were operating profitably, the SGMC and MAC were did at a loss and SGMC had closed the Bibiani and Konongo mines which were making serious losses.

From 1960 to 1980, various modifications were made to the sector code aimed at attracting significant private participation, but failed. The mining industry stagnated and up to 1985, there were no significant new investments in Ghana's mining industry sector output and almost all the mines declined and the sector contributed relatively little to gross national earnings.

Table 7 Post-Independence Performance of Ghana's Mineral Industry (1958-86)

| Year | Gold (Ounces) | Diamond (Carats) | Bauxite (M/t) | Manganese (M/t) |
|-------------|----------------------|-------------------------|----------------------|------------------------|
| 1958 | 747,493 | 1,165,577 | 180,480 | 686,676 |
| 1959 | 892,113 | 1,212,474 | 186,879 | 587,483 |
| 1960 | 915,317 | 1,138,665 | 197,938 | 577,648 |
| 1961 | 878,459 | 1,567,039 | 213,767 | 559,760 |
| 1962 | 823,115 | 1,171,328 | 207,929 | 443,391 |
| 1963 | 911,663 | 1,765,461 | 225,955 | 394,080 |
| 1964 | 912,592 | 1,968,176 | 271,025 | 424,657 |
| 1965 | 851,090 | 2,070,142 | 278,558 | 509,166 |
| 1966 | 708,906 | 2,301,659 | 312,508 | 63,800 |
| 1967 | 724,134 | 2,633,527 | 333,458 | 596,572 |
| 1968 | 757,346 | 2,398,631 | 317,171 | 484,696 |
| 1969 | 750,435 | 2,413,415 | 247,999 | 400,363 |
| 1970 | 714,442 | 2,355,797 | 259,993 | 354,726 |
| 1971 | 693,770 | 2,542,100 | 361,038 | 455,253 |
| 1972 | 710,013 | 2,482,822 | 356,479 | 476,690 |
| 1973 | 731,711 | 2,375,582 | 330,351 | 533,789 |
| 1974 | 709,550 | 2,406,860 | 327,627 | 255,393 |
| 1975 | 583,103 | 2,255,227 | 383,087 | 282,291 |
| 1976 | 515,654 | 2,231,791 | 282,084 | 384,162 |
| 1977 | 531,084 | 2,085,511 | 271,090 | 343,228 |
| 1978 | 465,651 | 1,817,818 | 271,448 | 321,443 |
| 1979 | 387,730 | 1,391,058 | 213,679 | 342,051 |
| 1980 | 437,669 | 1,227,071 | 224,501 | 368,593 |
| 1981 | 349,870 | 1,016,508 | 179,598 | 260,409 |
| 1982 | 335,724 | 893,016 | 63,530 | 176,871 |
| 1983 | 276,659 | 336,612 | 70,235 | 179,987 |
| 1984 | 282,299 | 341,978 | 44,169 | 267,996 |
| 1985 | 229,615 | 636,127 | 124,453 | 357,270 |
| 1986 | 287,124 | 560,538 | 226,461 | 262,900 |

Source: J. Songsore & Co (1994) *Mining & the Environment: Towards a Win-Win Strategy*

2.5.3 The Post-1986 Mineral Industry

The global mining industry has undergone vigorous change since the last 15 years. The changes in Ghana's mining sector are in direct consonance with worldwide trends in the sector. Improved exploration, mining and processing technology have revolutionized the entire mining industry worldwide, particularly in the domain of gold. The development of processes such as cyanide heap-leach and bio-oxidation has made viable the processing of low-grade material which hitherto was considered waste. The revolution in processing

technology also gave impetus to an evolution of mining and exploration methods. These have made possible more efficient processing of more complex ores such as sulphides and oxides. It has also resulted in an upsurge in exploration and mining activity worldwide. In the area of gold, traditional underground mining is being abandoned in favour of surface mining.

Apart from these technological innovations which account for the upsurge in mining activities globally, the most fundamental development in the industry from the early 1980s to date has been in the area of the mineral policies of mineral-rich countries, particularly in the developing world. The global technological movement and the policy dynamics in the industry have resulted in the widening of the axis of mining investment opportunities and a re-orientation of focus of international mining and mining-related companies. The increasing lead role played by international junior companies and African mining is well noted.

The main purposes of the privatisation programme have been to reduce the role of the state in the economy and to improve business competitiveness and efficiency; to reduce the fiscal deficit by using the proceeds from the sales to retire external and domestic debt and to generate new cash flows through investment and tax revenues. In response to this global demand for policy changes to attract international mining investment, Ghana shifted its focus from direct state investment in the mining sector to promotion and regulation of private companies. Within the framework of the country's economic recovery programme of 1983, and more specifically under its structural adjustment programme, the mining sector was a target for reforms to address the concerns of investors and financiers, to arrest and reverse the industry and to ensure growth. The policy changes have achieved the desired results with respect to investor perception of the investment environment and the volume and value of

mineral output. The country fast became a citadel of commerce and mining in West Africa. Ghana is now known international, to be among a few selected African countries with most attractive geological and investment environment.

Comparative geological ranking of African countries placed Ghana third after South Africa and Zimbabwe. For the most attractive African countries from the general perspective of mining investment, Ghana is ranked third after Botswana and Zimbabwe respectively. Employment in the minerals sector also surged, at least up to close of 1995. The total labour force of the sector rose from 15,069 in 1987 to 22,500 in 1995. This figure represents full-time employees of mining companies alone and excludes exploration companies and mining support service companies.

Table 8 Performance of Ghana's Mineral Industry under SAP (1998)

| Year | Gold(ounces) | Diamond(carats) | Bauxite(Mt) | Manganese(Mt) |
|-------------|---------------------|------------------------|--------------------|----------------------|
| 1987 | 328926 | 440681 | 201483 | 242410 |
| 1988 | 373937 | 259358 | 299939 | 284911 |
| 1989 | 429476 | 285636 | 374646 | 273993 |
| 1990 | 541400 | 636503 | 368659 | 246869 |
| 1991 | 845908 | 687736 | 324313 | 311824 |
| 1992 | 998195 | 656421 | 399155 | 276019 |
| 1993 | 1261424 | 590842 | 364641 | 295296 |
| 1994 | 1430845 | 757991 | 451802 | 238429 |
| 1995 | 1708531 | 631708 | 530389 | 186901 |
| 1996 | 1606880 | 271493 | 383370 | 300000 |
| 1997 | 1788961 | 714341 | 504401 | 436903 |
| 1998 | 2481635 | 808967 | 442514 | 536871 |

Source: J. Songsore & Co. (1994) mining & the environment: towards a win-win strategy

2.5.4 Methods of Mineral Exploitation

Down and Stock (1997) defines mineral exploitation as the removal of minerals from the earth's crust in the service of man. Mineral exploitation had been on-going in Ghana before the coming of the Europeans. The operations were extremely simple. Alluvial mining was most widespread and practiced along rivers. Sediment was scooped from the shores, stored in canoes or bowls and washed repeatedly to separate gold particles. Shallow-pit surface mining and deep shaft mining also occurred. At the beginning of the Trans Saharan trade, gold was collected as dust or nuggets by rural inhabitants, but increasing demand from Arabic traders intensified gold production. For 700 years the Islamic world was the only external influences on West Africa (Hilson, 2005).

In Ghana today there are both small and large scales mining. The general processing techniques are hand picking, amalgamation, cyanidation, floatation electro winning and ore roasting) Most parts of Ghana have three main gold deposits. Placer or alluvial deposit non-sulphidic pale placer or free milling and oxidized ore (Kortatsi, 2004).

2.5.4.1 Large-Scale Mining

Large scale mining is today mainly conducted as surface mining. Miller 1985 describes surface mining as the process where mechanized equipments are used to remove the overlying layers of soils and rocks known as overburden rocks and vegetation so that the underlying mineral deposits can be extracted with large power shovels. Cyanidation is the most common technique in the western region of Ghana where the bulk of the gold is mined and is used for non-sulphidic or paleplacer (Akosa and Adimado 2002 and Kortatsi 2004). Non-Sulphidic paleplacer ore occurs mainly in hard rock. It is particularly associated with the Banklet conglomerates of the Tarkwa formation. Teberebie Goldfields Limited in the Western Region and the Ghana Australian Goldfields (GAG) use this ore (Kortasi 2004). This technology is typically conducted as drilling, blasting, haulage of the ore, crushing and

screening, agglomeration, haulage and stacking. Lime (CaO) is now applied to the ore to raise the PH to between 10.5 and 11.0. Sodium cyanide solution (NaCN) is used for heaped into plastic lined pads but between 45-450 l/day of sodium cyanide solution per hectare possibly leaks out into the environment (Kuma and Younger 2004). Finally, gold is recovered through electro wining (Akosa *et al.*, 2002 and Kortatsi 2004).

2.5.4.2 Small Scale Mining

Small scale mining in Ghana is defined as mining by any method not involving substantial expenditure by any individual or group of persons not exceeding nine in number or by a co-operative society made up of ten or more persons” (Government of Ghana 1989). They (small scale) mines are estimated to number over 150,000 in Ghana of which many operate illegally on concessions belonging to large scale or in restricted areas (Ghana Academy of Arts and Sciences 2003) The illegal small-scale miners account for approximately 10 percent of the gold production in Ghana (Ntibery B. 2004) These mining activities are locally referred to as “galamsey” (Hilson 2002) The technique mostly used for small scale mining is amalgamation (Akosa 2002) In this process, mercury is mixed with gold concentrate to form gold amalgam, which is then heated to separate the gold (Ntibery *et al.*, 2003). Both illegal and legal small scale mining are practiced in the country Avotri *et al.*, (2002). In the Tarkwa area of Western Region of Ghana, small scale mining is found almost everywhere, both in the Forest and along rivers and streams. Small scale mining is practiced all year around and accounted for about 20,000 in the Wassa District of the Western Region alone. Out of this number of small scale miners, about 90percent operate illegally. Currently, about 168 small scale mining concessions are valid or operate legally in the region (Ntibery, 2004).

2.6 Contribution of Minerals to National Economy

Mining underpins industrial development. It is the economic basis and one of the main influences on the way of life of those regions where it takes place. Since the beginning of the industrial revolution, man has searched the earth for minerals that are processed and converted for purposes including energy provision. Today, mining is of fundamental importance in the economy of a number of developed and developing countries. The importance of the mining industry to the economy of Ghana cannot be over emphasized, having overtaken cocoa as the largest foreign exchange earner in 1991, Adadey (1997)

The United Nations Organization's (UNO's) definition of a mineral economy is those economies where mining generates at least 10 percent to Gross Domestic Product (GDP) and mineral exports are at least 40 percent of their foreign exchange earnings. Ghana is not exactly classified as a mineral economy by the UN definition. About 40 percent of gross foreign exchange earnings come from the mining sector and it generates 5.7 percent GDP (Aryee, 2001). The mining sector contributes about 7 percent of Ghana's total corporate tax earnings, 32 percent of total exports, 11 percent of government revenue the sectors share of GDP has increased from 1.3 percent in 1991 to 5.1 percent in 2005, 5.5 percent in 2006 and 6.7 in 2007 (2008 Budget statement) The sector also employs about 15,000 people in the large scale mining industry whilst over 500,000 people are engaged in small scale gold diamond, sand winning and quarrying. In 2005, export revenues from minerals sector amounted to US 1 billion.

In Ghana, gold exports rose over 3 percent between 1990—2004 and overall mining accounted for 11 percent of total revenues. Based on 2003 Government of Ghana (GOG) figures, Ghana earned only about 5 percent of total value of exports of about US 46 million

out of a total of 893 million (UNCTAD 2005). This is a clear case of revenue loss to the country. The following are clear manifestations of this.

- No visual improvement of poverty situation in general and mining communities in particular (Poverty levels is 28.5 percent, GLSS5)
- Lack of essential services such as education water and health, particularly in mining communities
- Under one year mortality 111 per 1000 births 2005.
- No clear National mineral or mining policy
- Absence of value added mineral processing and efficient utilization of mineral wealth, a classic case of the resource curse syndrome.

These notwithstanding, mining companies cannot be said to have done nothing towards the development of the communities in which they operate. Some of these companies have provided school infrastructures and facilities, good drinking water, electricity and health care facilities to the communities in which they operate. According Collins Dauda Minister of Lands and Natural Resources, Newmont Ghana Gold limited, the operators of the Ahafo mines in the Asutifi District had paid six million Ghana cedis into the Newmont Ahafo Development Fund to be used to initiate development projects in the communities in the district affected by mining.

Civil society organizations advocate for good governance and development of mining communities. The organizations define good governance and development to include active participation of key stakeholders which will promote accountability, transparency and equity required in the distribution and utilization of mineral revenue This collaboration, they argue is a required necessity which district assemblies must strive to achieve in order to promote the required sustainable socio economic and human development. In the opinion of the

organization the absence of the collaboration is bound to generate conflicts and agitations in mining communities. The groups outline chronologically past conflicts which arose as a result of lack of transparency in the utilization of mineral revenue especially royalties.

February 24, 2004 - Tension mounting over Newmont gold, prospecting for gold in Nkaseem in the Asutifi District.

March 25, 2004 - cyanide spillage, EPA orders the closure of Sankofa mines.

Nov. 30, 2005-mining destroys the ecology of Lake Bosomtwe. Hon. Simon Osei Mensah

April 1, 2006 - Illegal miners had given ultimatum to safeguard nation security.

April 19, 2006 - Galamsey, chieftaincy conflicts security challenges.

April 20, 2006 - Wassa chiefs worried over upsurge of small scale mining.

May 1, 2009 - oil find threatens the livelihood of fishermen.

February 2010-cyanide spillage, Newmont to compensate the affected communities.

(Resource Watch Agenda, Edition 1, May 2009).

2.7 Chirano Mines

Chirano Gold Mining Ltd., which was originally owned by Red Back Mining NL of Australia (95%), started working on the development of the Chirano property, which is located adjacent to the Ghana Bauxite Company GBC mine at Awaso. In November 2003, Red Back Mining NL signed a merger agreement with the Canadian junior Champion Resources Inc. The new company, Red Back Mining Inc. of Canada, became a holding company for Red Back Mining NL and the Chirano Project. In February 2004, Champion Resources released the findings of its feasibility study on the project. The Chirano resource was estimated to be 22.1 Mt of measured and indicated resources at a grade of 2.1 g/t gold, which is located in 14 separate gold deposits over a 14-km strike length, and a probable reserve of 12.6 Mt at a grade of 2.3 g/t. Mineralization occurs in fractured and altered

granites intruded along a shear zone between Proterozoic Birimian Formation mafic volcanic rocks and Tarkwaian Formation sediments. A capital cost of \$44 million was spent on the 15-month-long construction of the open pit mine, mill, and CIL plant. The project was estimated to produce an average of 4,040 kg of gold during a 6.5-year mine life based on treating 2 Mt/yr of ore. Chirano held exploration licenses on six other areas within Ghana (Red Back Mining Inc., 2004; RSG Global, 2004).

2.8 Impact of Mining and Environmental Degradation

Large-scale mining

Large and small scale mining cause somewhat different environmental concerns. Akosa *et al.*, (2002) highlights major adverse impact and environmental concerns of large scale mining as indicated below; Land degradation for example removal of vegetation cover and destruction of flora and fauna. The processing technique leads to contamination of water bodies and soil by release of CN, As, SO_4^{2-} , and heavy metal as Pb, Cu, Zn and Fe. There have been a number of accidental cyanide spillages in Ghana. The major spillage occurred in 1989, 1991, 1994, 1996, 1999, 2001 and 2009.

Roasting of ore containing pyrite gives rise to the production of sulphur Dioxide SO_2 in the atmosphere which produces acid rain. The acid water then releases high levels of toxic ions from the rock matrix in the ground water. This has been the main mode of extraction for the Prestea mine during the last decade. SO_2 could also be transported with north –eastern winds from the Ashanti Goldfields in the northeast (Kortasi, 2004).

The management of waste from large scale mining is done in accordance to approved environmental plans. The spent heap and waste heaps are stabilized and re-vegetated. Tailing slurries are channelled into tailing dams that also are re-vegetated. Reagent containers and packing materials are sold out to contractors who dispose of them. The monitoring of these contractors is poor as spent oil and grease are sold to end-users.

2.9 Reclamation

The final stage in the operation of most mines is *reclamation*, the process of closing a mine and re-contouring, re-vegetating, and restoring the water and land values. The best time to begin the reclamation process of a mine is before the first excavations are initiated. In other words, mine planning engineers should plan the mine so that the reclamation process is considered and the overall cost of mining plus reclamation is minimized, not just the cost of mining itself. The new philosophy in the mining industry is *sustainability*, that is, the meeting of economic and environmental needs of the present while enhancing the ability of future generations to meet their own needs (National Mining Association, 1998). In planning for the reclamation of any given mine, there are many concerns that must be addressed. The first of these is the safety of the mine site, particularly if the area is open to the general public. The removal of office buildings, processing facilities, transportation equipment, utilities, and other surface structures must generally be done. The mining company is then required to seal all mine shafts, adits and other openings of physical hazards. Any existing highwalls or other geologic structures may require mitigation to prevent injuries or death due to geologic failures.

The second major issue to be addressed during reclamation of a mine site is restoration of the land surface, the water quality, and the waste disposal areas so that long-term water pollution, soil erosion, dust generation, or vegetation problems do not occur. The restoration of native plants is often a very important part of this process, as the plants help build a stable soil structure and naturalize the area. It may be necessary to carefully place any rock or tailings with acid-producing properties in locations where rainfall has little effect on the material and acid production is minimized. The same may be true of certain of the heavy metals that pollute streams. Planning of the waste dumps, tailings ponds, and other disturbed

areas helps prevent pollution, but remediation work is also needed to complete the reclamation stage of mining and satisfy the regulatory agencies.

The final concern of the mine planning engineer may be the subsequent use of the land after mining is completed. Old mine sites can be converted to wildlife refuges, shopping malls, golf courses, airports, lakes, underground storage facilities, real estate developments, solid waste disposal areas, and other uses that may benefit society. By planning the mine for a subsequent development, mine planners can enhance the value of the mined land and help convert it to a use that the public will consider favorable. The successful completion of the reclamation of a mine will enhance public opinion of the mining industry and keep the mining company in the good graces of the regulatory agencies. The fifth stage of the mine is thus of paramount importance and should be planned at the earliest possible time in the life of the mine.

2.10 Types land ownership and interests in land

All over the world, various systems of land ownership have developed under the influence of historical, cultural and economic factors. These systems are often subjected to a continual process of change. In Ghana land is owned by three (3) categories of persons – the public lands owned by the state, the stool/skin lands owned by traditional authorities and family private lands owned by a particular family or individual.

Gambrah (2002) defines public lands to be those compulsorily acquired by government for administrative and development functions and which are in the absolute ownership of the state. Article 20 of the 1992 constitution and state lands Acts of 1962 (Act 125) makes it possible for the government to acquire any piece of land if it is seen in the interest of the

general public. Such a move confers the absolute interests of the land in the hands of the government.

The original owners or occupiers of such lands are however paid compensation. Gambrah (2002) identifies vested lands to be a form of public land declared under the Administration of lands Acts (Act 123) also of 1962. The land is vested in the state and administered for the benefit of the community. In that instance, he said, the land has a dual ownership; the state has the legal interest in the land whilst the local community possesses the beneficial interest. In an article captioned “The right to human rights versus the right to mine” featured in the second Edition (October 2009) of Resource Agenda the writer asserts that the compulsory acquisition of land by government for development may seem meaningless to a great majority of mining communities in the face of poverty, squalor, inhuman and degrading conditions as against the massive mineral wealth cart away from their land of birth. A visit to many mining communities by the writer reveals operations of many mining companies in clear violation of the provisions of the 4th Republican Constitution relative to the economic well-being.

Stool/skin land is one belonging to a community with stool/skin as the traditional symbol of the soul of ancestors who originally owned the stool /skin and therefore the land. The land is administered according to the principles of customary or native law (Gambrah, 2002). The traditional ruler administers all such lands in trust and on behalf of his people. He holds an allodial or absolute interest in the land and uses the rights attached to the interest to distribute the land to the community. Family or private lands belong to a particular family/individual. The head of the family holds the allodial title to the land and shares it among family members by following prevailing customs and traditions. Until the coming into

force the 1992 constitution, individual could own the freehold title. Article 267 however debar individuals from acquiring such rights.

Public lands constitute about 20percent of the total landmass of Ghana. The remaining 80 percent lie in the hands of the stool/skins and individuals (Asiamah, 2008).The continuous search for minerals resulting in the massive exploitation of the resource is vesting more lands in the hands of the state thereby denying traditional authorities and the family or individuals the land that serves as a source of sustenance.

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2.11 Livelihoods

Carney (2001) defines livelihood to comprise the capabilities, assets (including both material and social resources) and activities required for a means of living. She further intimates that a livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future while not undermining the natural resource base.

William (1984) who did research on livelihood in London in the early 1980s considers livelihood as always being more than just a matter of finding or making shelter, transacting money and preparing food to put on the table or exchange in the market place. To him, it is equally a matter of the ownership and circulating of information, the management of social relationships, the affirmation of personal significance and group identity and the inter relation of each of these tasks to the other. All these productive tasks according to Williams constitute a livelihood. For anthropologists such as William, livelihood is an umbrella concept which suggests that the social life is layered and that these layers overlap (both in the way people talk about them and the way they should be analyzed. This is an important analytical feature of the notion of Livelihoods.

One feature that these definitions and interpolations share in common is that they eloquently underline the generally accepted idea that “Livelihood” deals with people, their resources and what they do with these resources. Livelihoods essentially revolve around resources (such as land, crops, seed, labour, knowledge, cattle, money, social relationships etc. etc). However, these resources cannot be disconnected from the issues of access and changing political, economic and socio-cultural circumstances. According to Ellis (2001) Livelihoods are also about creating and embracing new opportunities while gaining a livelihood or attempting to do so. People may at the same time, according to him have to cope with risks and uncertainties such as erratic rainfall, diminishing resources, pressure on land, changing life cycles and kinship networks, epidemics such as HIV/AIDS, chaotic markets, increasing food prices, inflation and national and international competition.

Sustainable livelihood comprises activities intended to help economically disadvantaged sections of society meet their daily subsistence needs in a manner that is dignified, locally appropriate and environmentally sustainable (Development Alternatives 1999). It is a way of empowering people to enjoy a healthy living by earning enough money to provide for basic amenities such as food, clothing and shelter.

The idea of sustainable livelihood gained more prominence from the United Nations (UN) system particularly the United Nations Conference on Environment and Development (UNCED) and involves a system of approaching development that incorporates all aspects of human livelihoods and the means by which people obtain them (Singh and Tin, 1994, 1995). Livelihood is said to include the assets, activities and entitlements that enable a people to make a living (Singh and Lawrence 1997) Sustainable livelihood also deals with risks as well as how people cope with stresses and adapt to long-term changes that affect their livelihoods (Rennie and Singh 1996) A livelihood is considered sustainable when it allows

people to make a living without foreclosing on options for others to make a living today or in the future (Hon *et al.*, 1997) However, sustainability has another dimension, the ability of a livelihood to enable people cope with short term stress or long term change.

According to Lawrence (1997), livelihoods are not only about jobs, although a job may be an important component of a livelihood in many cases. This is because to him coping strategies usually have a non-job related aspects even where the stress is a result of job loss (<http://Sacoast.wwc.ac.za/education/resources>, 2/ 02/ 2010). Parsons (1957) cited in Dorner (1972) emphasizes the importance of land for sustainable livelihoods. In his words, the land represents the principal form of economic and political power and its ownership reflects social class structures and relations. Peasants, according to him have throughout the centuries agitated and fought for more secure rights to the land they cultivated. To the individual peasant farmer, their hold on the land has long been both a hallmark of their status and the elementary basis of their survival. With a sufficient land of their own, some have lived well, without land countless millions have suffered literal starvation. The peasants' attachment to land is not a mere whim or prejudice. It reflects solid judgments of the requirements for survival which have matured through centuries of precarious and rugged living.

Man cannot live without land, from which he derives his sustenance land is as a matter of fact the mainstay of human life. It must be observed that while there has not been much change in the total area of land since ancient times, the increase in mineral exploitation particularly surface mining, if unchecked could reduce the land available for cultivation thereby affecting the sustenance of people who directly depend on it.

2.12 Government Policies and Programs

Legislation that affects mining and mineral exploration in Ghana includes the Minerals and Mining Law, 1986 (PNDCL 153), as amended by the Minerals and Mining (Amendment) Act, 1994 (Act 475); The Investment Promotion Act, 1994 (Act 478); the Additional Profits Tax Law, 1985 (PNDCL 122); the Minerals Commission Law, 1986 (PNDCL 154); the Minerals (Royalties) Regulations, 1987 (LI 1349), the Environmental Protection Agency Act, 1994 (Act 490), and the Environmental Assessment Regulations, 1999, and as amended, 2002. The 1986 mining law had been instrumental in attracting more than \$5 billion in foreign investment to the Ghanaian mining industry between 1986 and 2002. Act 475 reduced the 45 percent general mining corporate tax rate to 35 percent, which is the same as that imposed on other industries.

The Petroleum (Exploration and Production) Law, 1984 (PNDCL 84), sets out the policy framework and describes the role of the Ministry of Mines and Energy, which regulates the industry. Ghana National Petroleum Corp. (GNPC), which is empowered to undertake petroleum exploration and production on behalf of the Government, is authorized to enter joint ventures and production-sharing agreements with commercial organizations; GNPC was established under the GNPC Law of 1983 (PNDCL 64). The regulation of artisanal gold mining is set forth in the Small-Scale Gold Mining Law, 1989 (PNDCL 218). The Precious Minerals Marketing Corporation Law, 1989 (PNDCL 219), set up the Precious Minerals Marketing Corporation (PMMC) to promote the development of small-scale gold and diamond mining in Ghana and to purchase the output of such mining, either directly or through licensed buyers. Concerned with the drop off of investment in the mining sector since 1999, the Ministry of Mines prepared draft legislation to revise PNDCL 153 to

enhance Ghana's international competitiveness; the legislation was submitted to Parliament in mid-2002.

The Ministry of Mines and Energy oversees all aspects of the Ghanaian mineral sector and is the grantor of mineral and energy exploration and mining leases. Within the Ministry, the Minerals Commission has responsibility for administering the Mining Act, recommending mineral policy, promoting mineral development, advising the Government on mineral matters, and serving as a liaison between industry and the Government. The Ghana Geological Survey Department conducts geologic studies, and the Mines Department has authority in mine safety matters. All mine accidents and other safety problems also must be reported to the Ghana Chamber of Mines, which is the private association of operating mining companies. The Chamber also provides information on Ghana's mining laws to the public and negotiates with the mine labour unions on behalf of its member companies. During 2003, a debate was initiated on the amount and distribution of mining royalties. According to the International Monetary Fund (2004), "under Article 22 of the Minerals and Mining Law, mining companies are required to pay no less than 3percent and, depending upon their profitability rate, up to12percent of their gross revenues as royalties." Twenty percent of the mining royalties go to fund a Minerals Development Fund. Half of the Development Fund supports the mining agencies, such as the Mines and Geological Survey Departments and the Minerals Commission. The other half of the Minerals Development Fund is transferred to the Office of the Administrator of Stools (Chieftaincy) Lands to be distributed to the mining communities. The Office of the Administrator of Stool Lands retains 10percent and distributes the remaining 90percent to local authorities for intended use in repairing environmental damage and development projects in the mining communities.

The stools of the mining areas receive 25 percent, the traditional authorities of the areas, 20percent, and the District Assemblies within the area of authority of which the stool lands are situated, 55 percent. The IMF review noted that revenues are not always used to benefit the mining communities. The Minister of State for the term “stool” refers to the carved wooden, or in the case of the Chief of the Ashanti Tribes, golden stool or seat that is the symbol of the chieftaincy. The traditional hierarchy of paramount, sub regional, and village chiefs dictates distribution of revenues.17.2 U.S. GEOLOGICAL SURVEY MINERALS YEARBOOK—2003Finance and Economic Planning recommended that the amount of royalties that flow directly to the mining communities be increased from 9percent to 30 percent (Coomson, 2003).

2.13 The Institutions that Govern the Acquisition of Land for Mineral extraction

The acquisition and possession of land for mineral extraction in Ghana is being regulated by a number of institutions ranging from traditional authorities to formal institutions. For the purpose of this study, the discussion of these institutions will be limited to six core land delivery and regulatory agencies and departments. This is because the other institutions particularly the traditional ones rely on these core institutions to function effectively. The Land Commission for instance has to give approval to any dealings in land by the traditional authority for them to be valid (Gambrah, 2002). The agencies and departments to be discussed are the lands commission, Land Valuation Board, The Geological Survey Department, the Environmental Protection Agency (EPA) minerals commission, Office of the Administration of Stool lands the land title registry.

According to Crook (2005) cited in Aryeetey (2007) the lands commission controls the allocation of all state owned land. The Commission is therefore responsible for the management of public and vested lands and the certification of stool lands transaction. The

commission also keeps records of deed and other documents on land. The land Title Registry, established in 1986 registers title to land and interest in Land. It is also responsible for maintaining an up to date register of titles to land protection of interest in land throughout the country. The functions of the Lands commission overlap with those of the land title registry.

The office of the administrator of stool lands collects revenues on customary stool lands, timber, royalties and ground rents on leases and remits them to stools and traditional councils. The administrator is required by law to establish a stool land accounts for each stool, collects stool land revenue and disburse such revenues to beneficiaries in specified proportion (1992 Republican Constitution). The EPA is a governmental agency responsible for implementing environmental Laws of Ghana. Environmental Protection Laws of Ghana date back to the colonial era. The Laws were mostly related to disease prevention and control. The laws were enforced in bigger towns and where government offices and factories were located. One of the earliest laws on the statute books is the beaches obstructions ordinance (CAP 240) of 29th January, 1887.

After Independence several laws were passed to help the young nation to develop its industrial capacity. Environmental protection however became topical in Ghana after the 1972 Stockholm convention. This led to the establishment of the environmental protection council in 1974. The council was later transformed to Environmental Protection Agency in 1974. The 1992 Constitution of the 4th Republican Constitution in chapter six specifically article 41k enjoins the citizens of Ghana to protect and safeguard the environment. This is for both employers and employees of Ghana. It is therefore not out of place that Parliament passed the environmental protection agency Act 1947. The Act among others mandates the EPA to perform Environmental Assessment Regulations Ghana Legal information GHANALEX retrieved from the internet on the 16 /02/2010. The minerals commission is responsible for the regulation and management of the utilization of the mineral resources of

Ghana and the coordination of the policies in relation to them. The inspectorate Division of the commission is responsible for instituting and enforcing health, safety and environmental standards in mines. It also ensures that mining companies and all mining related activities comply with Ghana's minerals and mining laws and regulations through active monitoring.

The Geological Survey Department is responsible for the provision of reliable and up to date geological information for national development through geological mapping, research and investigation. The department also acts as a repository of the country's geo scientific data. Gambah (2002) identifies a number of duplication of efforts by these institutions. In the first place he notes that a lease prepared at the lands commission when taken to the lands title registry will go through some of the processes it has already gone through at the lands Commission. Similarly when it comes to site inspection, three of the agencies; the Lands Commission, the Lands Valuation Board and Survey Department conduct the same exercise or procedures at various stages of the land acquisition process.

All these duplications he argues makes the procedures costly, time consuming and frustrating to anybody particular prospective investors who pass through these agencies to perfect their dealings in Land. Such frustrations end up not building the trust needed to properly, manage the land. There is therefore the need to streamline the activities of these agencies by specifying clear cut functions to encourage all including foreign investors to develop confidence and trust that these agencies are there to help them but not to complicate things and cheat them.

2.4 The National Land Policy of 1999

It is noted that efforts at preparing a land policy for the country dates back to 1973. The process is believed to have started when the law reform commission submitted an interim report on the reform of the land law in Ghana. It was however not until 1994 that the government received the final report. Taking into consideration the time lag between the commencement of the process and the time the government received the final report, one is tempted to believe that there was either lack of commitment to having the policy or there were so many rules that made it difficult to harmonize into a single policy. When the final report was eventually submitted, various committees were established and charged with the responsibility of studying the report and offer the needed advice. This finally culminated in the drafting of the national land policy in 1999. The Policy gave direction for the efficient management and use of land in the country. Before coming into effect of the policy the lands sector was plagued with problems which included general indiscipline in the land market manifested through land encroachment, multiple sale of lands, unapproved development schemes, haphazard development, and needless compulsory acquisition of lands by government without adequate and prompt compensation.

Other problems were weak land administration procedures, lack of consultation with land owners and chiefs in matters pertaining to land and lack of consultation, coordination and cooperation among land development agencies. Most of these problems were not actually new, they had however not been tackled promptly affirming the fears of lack of commitment on the part of implementers of land issues. The policy aims at ensuring the judicious use of the nation's land and all its natural resources by all sections of the Ghanaian society to promote the socio economic activities in a sustainable manner. The following specific objectives were outlined to achieve the aims of the policy:

- Ensure that every socio economic activity is consistent with sound land use through sustainable land use planning in the long term.
- Facilitate equitable access to and security of tenure based on registered land
- Protect the rights of land owners and their dependants from becoming landless and tenants on their own land.
- Ensure the payment within reasonable time of fair and adequate compensation for land acquired by government.
- Create and maintain effective institutional capacity and capability at the national, regional, district and where appropriate community levels for land delivery.
- Promote community participation and public awareness at all levels in sustainable land management and development practices to ensure the highest and best use of land, and thereby guarantees optimum returns on land.

2.15 The minerals and mining Act

1) In the wake of some concerns raised by some mining communities ,Non Governmental organizations [NGOs] and civil society groups both local and international, that mining has not benefited the communities in which these activities take place, the minerals commissions and chamber of mines jointly organized a conference on the theme corporate social responsibility in Ghana extending the frontiers of sustainable development. The outcome of the conference culminated in the new minerals and mining Act 703, 2006. The purpose of the Act is to revise existing minerals and mining law 1986[PNDC law 153] to reflect in our laws a new thinking and development in the mining industry and to consolidate it with the enactment on small scale gold mining. The PNDC law 153 when it was enacted in 1986 was hailed as one of the best enactments on the subjects in Africa and made Ghana an attractive destination for mining investment.

2) However, after nearly two decades of operation of the law, it has been realized that development in the industry requires a revision of the laws to reflect international best practices in the industry as well as to reposition Ghana as a major investment destination in Africa. The provision by law of an internationally competitive framework that ensures a stable and equitable tax regime and also takes cognizance of environmental protection as well as community interest was necessary to provide the basis for the development and sustainability of mining in the country.

3) The mineral and mining Act, Act 703, 2006 enacted by the President and Parliament of Ghana repealed PNDC law 153 [1986]. The law was given a presidential assent on March 22, 2006. The Act confers ownership of minerals in the State or Republic. Section one of the act states. 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 and continental shelf is the property of the Republic and is vested in the President in trust for the people of Ghana. The Act grants the President power of compulsory acquisition of land. Section two states; ‘where a land is required to secure the development or utilization of a mineral resource, the President may require the land or authorize its occupation and use under an applicable enactment for the time being in force’.

- To achieve the purpose of the Act, the following processes and procedures have been outlined for individuals or a body to go through to acquire a parcel of land of the purpose of mining. This include
- Mining activities require a right for the search, reconnaissance exploration or mining for mineral.
- Qualification for grant of mineral and right. Under the Act, the person must be a body incorporated under the company’s code 1963[Act 179], under the incorporated partnership Act [Act 152] or under the enactment in force.

- Obligation of holders of mineral right. The Act under this section requires among others that before undertaking an activity or operation, under the mineral right, the holder to the right shall obtain all necessary approvals and permit required from the forestry commission and Environmental Protection Agency for the protection of natural resources, public health and the environment.
- Compensation for the disturbance of ownership of surface right. Section 73 sub section 1 states, the owner or lawful occupier of any land subject to mineral right may claim from the holder of the mineral right compensation for the disturbance of the rights of the owner or occupier in accordance with section 74 of the act.
- Compensation principles: Section 74 sub section one states compensation that an owner or a lawful occupier may be entitled may include compensation for;
 - Deprivation of the use or any particular use of the natural surface of the land or part of the land.
 - Loss or any damage to any immovable properties.
 - In the case of land under cultivation, any loss of earnings or sustenance suffered by the owner or the lawful occupier having due regard to the nature of their interest in the land.
 - Loss of expected income depending on the nature of crops on the land and their life expectancy.

Access to court in respect of compensation Section 75 [1] among others states that the owner or lawful occupier of land affected by a mineral right shall not apply to the High Court for determination of compensation to which the person is entitled unless the person is dissatisfied with the terms of compensation offered by the title holder of the mineral right or as determined by the Minister under 73 [3] or 73[5] b.

According to Joyce Aryee, Chief Executive Officer, Ghana Chamber of Mines, the ambiguity and conflict in the interpretation of the minerals and mining Act 703 2006 needed to be addressed. She made specific reference to section 74 sub section [2] which states that ‘in making a determination under section 73(3), the Minister shall observe the provisions of article 20(2)(a) of the constitution which states that, in the case of compulsory acquisition of property, prompt payment of fair and adequate compensation shall be made’. She questioned what constitutes fair and adequate compensation [Daily Graphic February 17, 2010].

2.16 Land as a major determinant of Livelihood

Land is a major determinant of Livelihood and man mainly depends on it for virtually all his needs. However, the use to which land may be put, depends among others on the nature of the soil, its quality or fertility the mineral composition of the soil to mention but a few. Where soils are fertile coupled with favourable climatic or environmental conditions, people use the land for agricultural purposes. Incidentally, most of these lands which have for a very long time been used for the cultivation of food and cash crops as in the case of the Chirano area have now been seen to contain rich and valuable mineral resources such as gold, bauxite and diamond. With the exploitation of these minerals, availability, accessibility and security of land now very much depends on government development plan as most of these hitherto fertile lands have been taken over by mining activities.

When households are deprived of their lands which serve an amount of money is paid as compensation. The amount paid as compensation can affect the sustainability of livelihood.

Where a small amount is paid as compensation, the source of livelihood may not be guaranteed. What happens to the income generated from the alternative source of livelihood

has an influence on the livelihood source and for that matter sustainable livelihood. This is because livelihood does not just limit itself to jobs as seen in the Literature. Thus the household should be able to properly manage her resources to take care of all the additional needs. Thus, prudent management of the household's resources would also influence the livelihood sources.

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CHAPTER THREE

METHODOLOGY

This section considers how the research was conducted. It explains the sources of data, how the data was collected, analyzed and presented. It includes the description of the research models, the key variables involved and the sampling techniques employed.

3.1 DESCRIPTION OF THE STUDY AREA

Ghana has a land area of 238,539 km² and lies on the south central coast of West Africa between latitudes 4.5°N and 11.5°N and longitude 3.5°W and 1.3°E (Ghana EPA, 2000). It shares a common border with the Republic of Togo on the east, Burkina Faso on the north and La Cote d'Ivoire on the West. The tropical climate in Ghana is dominated by two major air masses: the dry and warm North East Trade Winds and the moist South-Western lies or the monsoons. The moist maritime monsoons are associated with rainfall while the dry Trade Winds bring dry conditions. Thus the country has distinct dry and wet seasons depending on the dominant wind in the area.

Temperatures throughout the country are typically high. The mean annual temperature is generally above 24°C, a consequence of the low latitude position of Ghana and the absence of high altitude areas. Average figures range between 24 and 30°C although temperatures ranging from 18 to 40°C are common in the southern and northern parts respectively. Spatial variability of temperature is experienced in terms of the diurnal and annual ranges as a result of distance from the modifying influence of the sea breeze.

Generally, rainfall in Ghana decreases from south to north. The wettest area is the extreme southwest where annual rainfall is about 2000 mm. In the extreme north, the annual rainfall is less than 1100mm. The driest area is the wedge-like strip from east of Sekondi-Takoradi, extending eastward up to 40km where the annual rainfall is about 750 mm. The dry conditions in the south eastern coastal strip are anomalous and are the cause of important differences in ecology and land use from the rest of the country. The seasonal distribution of rainfall is particularly important to the ecology and land use.

Two main rainfall regimes are identified:

- a) Double maxima regime occurring south of latitude $8^{\circ}30'N$. The two maximum periods are from May to August and from September to October.
- b) The single maximum regime found north of latitude $8^{\circ}30'N$ where there is only one rainy season (May to October), followed by a long dry season from November to May.

Study Communities in the Chirano Gold Mines Limited (CGML)

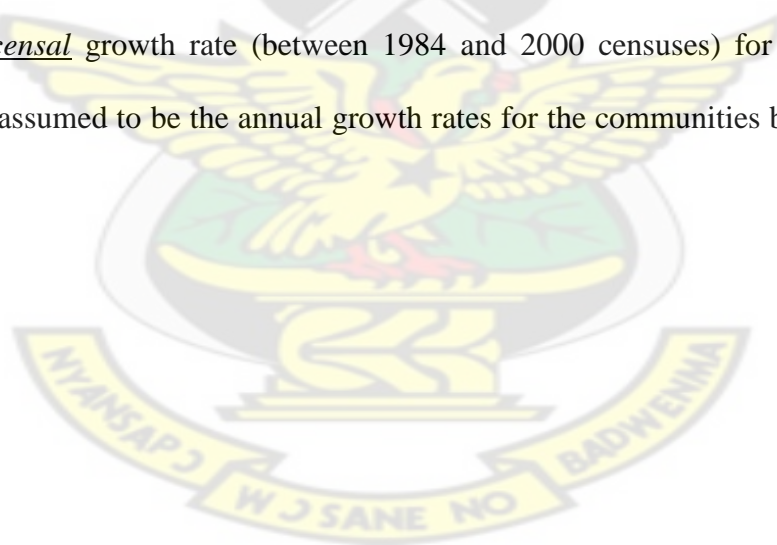
The study was conducted in three communities, Paboase, Akoti and Etwebo, fringing the concession area of the Chirano Gold Mines Limited situated in south western Ghana (Figure 3.1). The Chirano Gold Mine Limited is 100 kilometres southwest of Kumasi, which is Ghana's second largest city. The township of Bibiani, the site of an existing large gold mine, lies 15 kilometres north-northeast of the project area (37 kilometres by road). Access to the mine from the capital Accra is via a sealed highway to Kumasi and then sealed highway running southwest towards Bibiani and onwards to Sefwi-Bekwai. The final approach is either by a 22 kilometre gravel road from Tanoso Junction (15 kilometres south of Bibiani) or by a 13 kilometre gravel road whose junction is approximately 9 kilometres beyond

Sefwi-Bekwai. The project area is dominated by steep terrain and dense vegetation interspersed with small agricultural plots of palm oil, cassava and cocoa.

Table 9: Projected Yearly Populations of Selected Communities

| Community | Population | | | | | | | | | | |
|-----------|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
| Akoti | 491 | 507 | 523 | 540 | 557 | 575 | 593 | 612 | 632 | 652 | 673 |
| Etwebo | 704 | 727 | 750 | 774 | 799 | 824 | 850 | 878 | 906 | 935 | 965 |
| Paboase | 1,186 | 1,224 | 1,263 | 1,304 | 1,345 | 1,388 | 1,433 | 1,479 | 1,526 | 1,575 | 1,625 |

Population growth rate is an essential variable when making population projections. In order to project current population sizes for selected project communities, the Monitoring and Evaluation unit obtained data relevant data from the Ghana Statistical Service (GSS). GSS, however, could not readily provide the population growth rates at the district level. The 3.2% *inter-censal* growth rate (between 1984 and 2000 censuses) for the entire Western Region was assumed to be the annual growth rates for the communities between Years 2000 and 2010



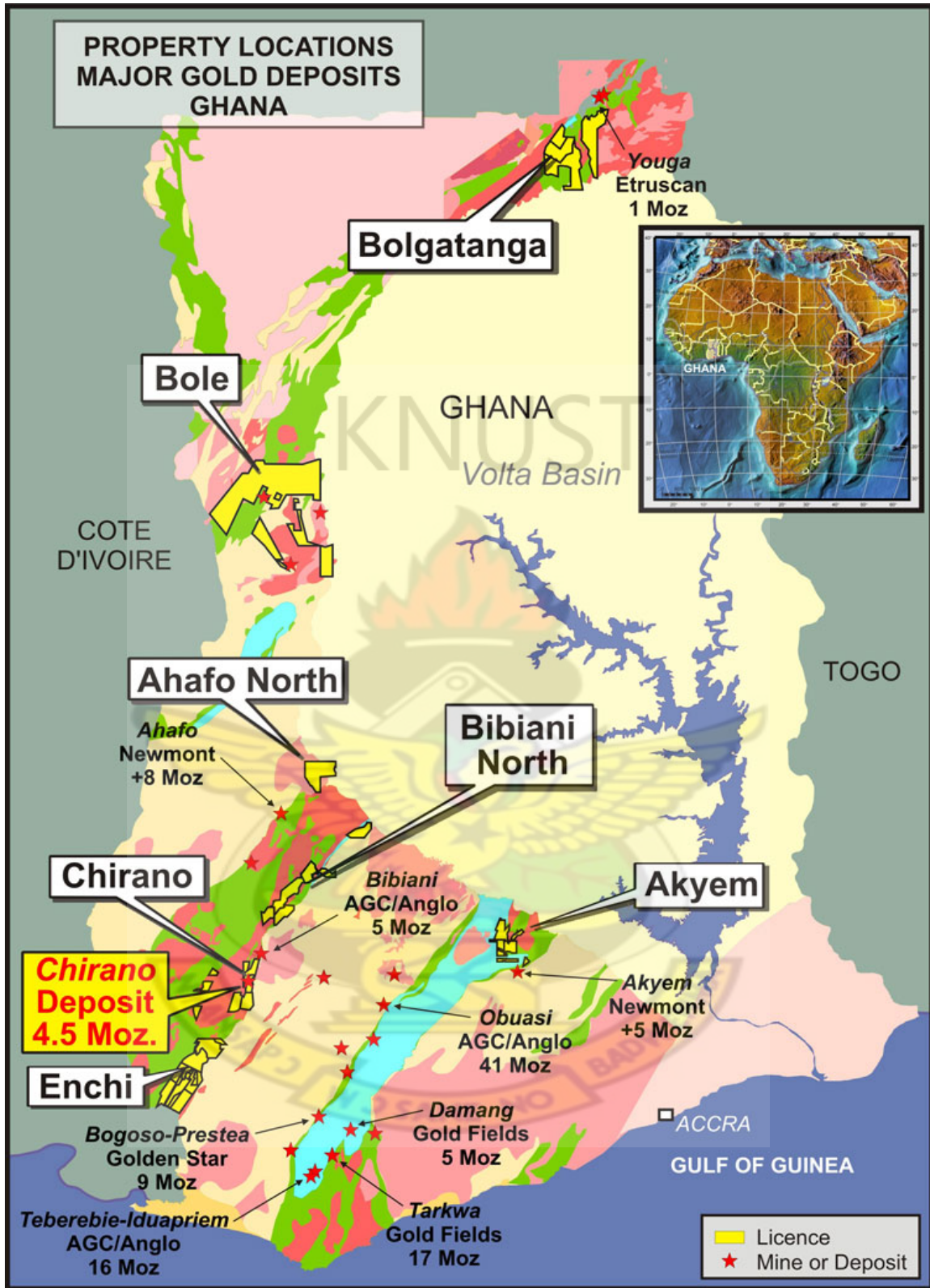


Figure 3.1: Gold deposits in Ghana and the location of the Chirano Gold Mines Ltd.

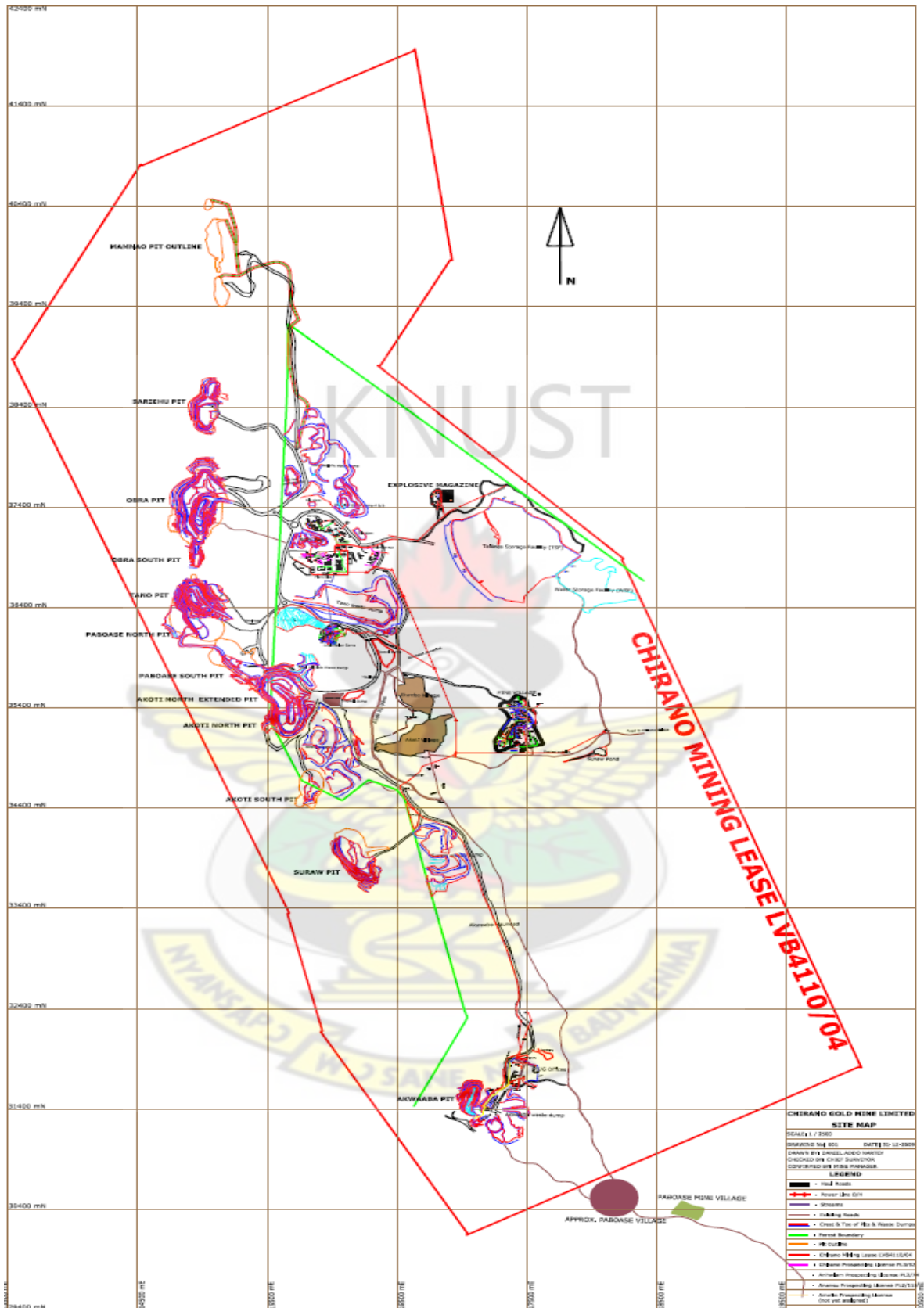


Figure 3.2 The concession of the Chirano Gold Mines Ltd.

3.2 DATA COLLECTION

Two categories of data namely primary and secondary data were collected for the study.

Familiarization visit and reconnaissance survey of these communities were undertaken in order to establish the needed rapport with members of the District Assembly, the communities (traditional leaders, youth and opinion leaders) for subsequent interactions, prepare itinerary for field operations and pre-test questionnaire and also mobilize logistic support, explain the essence of the study and the benefits to the communities members including the opinion leaders and the personalities who have special insight or views about the issues being studied and also to solicit for their cooperation as the study progresses. The needed relation for mutual understanding, trust and agreement between the communities on one hand and the researcher on the other hand was sought.

3.2.2 Primary Data

Both quantitative and qualitative primary data were collected on livelihood issues such as income food security, proper health care, general household characteristics and sustainable utilization of natural resources. This was aimed at determining the extent to which the welfare of community members have been promoted or rendered vulnerable as a result of the introduction of the mining activities. To achieve this, questionnaire (Appendix...) following the reconnaissance survey and field visits, field observation and target group discussion in the study communities, was administered to selected households and individual farmers whose livelihoods have been affected by the mining activities. The questionnaire was pre-tested to determine its effectiveness and was self administered in the simple random manner. No Ghanaian language version of the questionnaire was developed, but the questionnaire was read in English and translated in Twi. Interview was conducted and focused group discussion held with the Traditional Authorities in the communities who were knowledgeable in the history of the concession, customary practices and the patterns of the society, all in the local language, 'Asante Twi'.

The items in the questionnaire were made as clear as possible, void of ambiguity, but further explanation were given on items when and where respondents requested. Interviews with the community members (Plate 1) were conducted to solicit for any necessary information that was not captured by the questionnaire. Personal or direct observations of the mines sites and the communities were also made to ascertain their possible effects on the environment as compared to the perception of the communities.



Plate 1: An Interview with a community member at Akoti

3.2.3 Sample size

A total of one hundred and fifty (150) people (respondents) were sampled from the three communities and the district assembly. Diaw *et. al.*, (2002) recounted that it is the size of the local population that determines the sample size and that a community whose population is

below five hundred (500), 10% sampling intensity is appropriate. Also for a community with population ranging from 501 to 1000, 5% but above 1000 people 2.5% would be appropriate.

3.2.4 Inclusion Criteria

Respondents were residents of the concession communities for not less than a year since the mining activities began. Respondents were 16 years and above.

3.2.5 Consenting Process

Respondents were briefed on the need and benefits of the study and the entire procedure that were to be followed. After this, their consents were sought and the field data collection began.

3.3 DATA ANALYSIS AND PRESENTATION

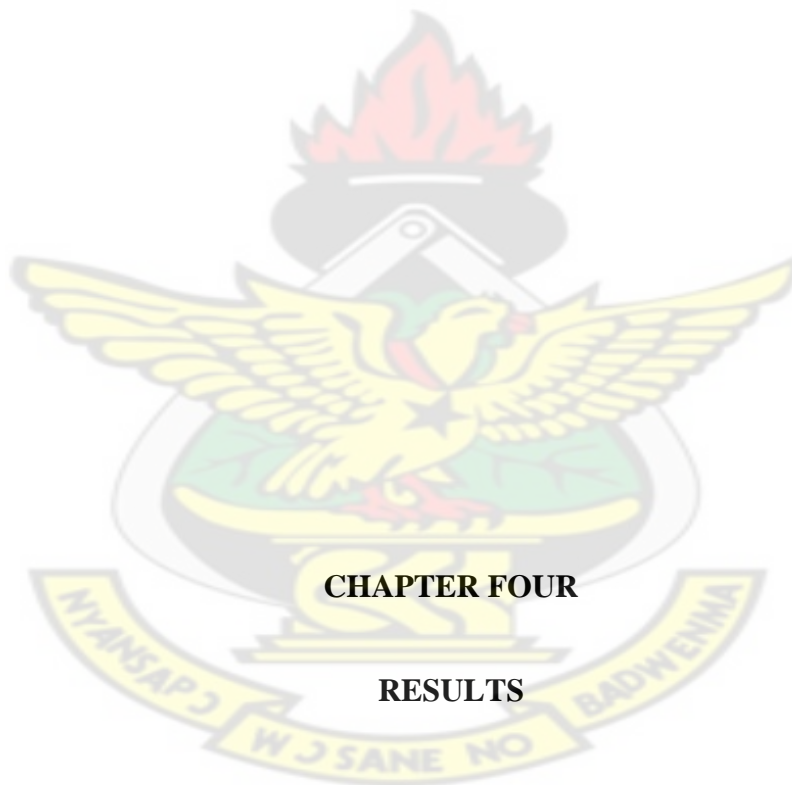
The analysis began with a description of the respondents' biographical profiles. Data from Paboase, Etwebo and Akoti were analyzed and then compared to determine if there were any significant differences among the communities as far as their livelihood were concerned. This was followed by a graphical analysis of the culture and employee commitment.

The Statistical Package for Social Sciences (SPSS), computer software was used to carry out simple statistical analyses for percentages, ranges, ratios and central tendencies e. g. means where applicable. Tables and charts were used to emphasize important relationships, trends and classification, explanation to describe relationship between variables and to evaluate evidence gathered from the study.

3.4 CHALLENGES

The main challenge encountered was vehicular transportation difficulty due to the remoteness of certain parts of the communities which, in turn, made it difficult to reach out to the intended respondents. In such instances, the challenges, though quite difficult, were surmounted or dealt with successfully by travelling on foot.

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4.0 Introduction

Yin (2003a) noted that research results constitute a very important stage of a research exercise and that it is an integral part of the survey being affected by its overall quality. In this chapter, the results of the primary and secondary data obtained for the study are presented. It focuses essentially on analysis of the benefit resulting from the existence of Chirano Gold Mines Limited to the communities. These have been done by using figures

(including pie Charts, bar charts) and tables for easy interpretation and determination of trends. Remarkable observations have also been pointed out.

4.1 Gender of Respondents

The gender distribution of the respondents in the three communities Paboase, Akoti and Etwebo of the Chirano concessional area were 77 males (51.30%) and 73 females (48.70%). That is, nearly equal proportions of males and females were considered in the study. The substantial number of females (73) is an indication of fair representation of males and females and that gender biasism was eliminated in the study.

4.2 Age Distribution of Respondents

The respondents were in the active age group (between 16 and 54 years). The population may therefore be considered, described and tagged as active and have high expectations in life and inverse relation. This was followed by those of ages from 25 to 34 yrs (24%) and those between 35 and 44 years (21%). Relatively older people formed minority (14%) of the workforce (figure 2).

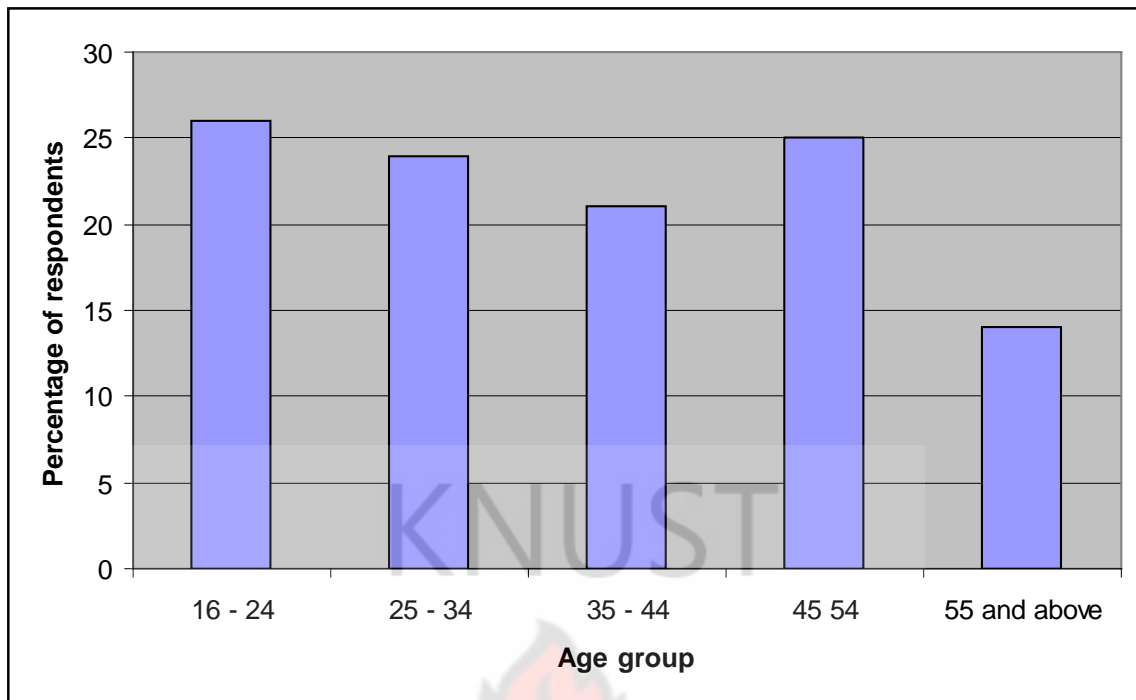


Figure 2 The Age distribution of respondents in Paboase, Akoti and Etwebo

4.3 Education Background

The quality of education, reflected in the level reached, was the basis on which educational status of respondents was assessed. With the exception of a few respondents (5.1%) who have had no education at all others have had a wide range of education. They range from the least level, basic education (34.2%) to the highest educational level, tertiary education (9.0%). They were however dominated by those who have had basic education (figure 3).

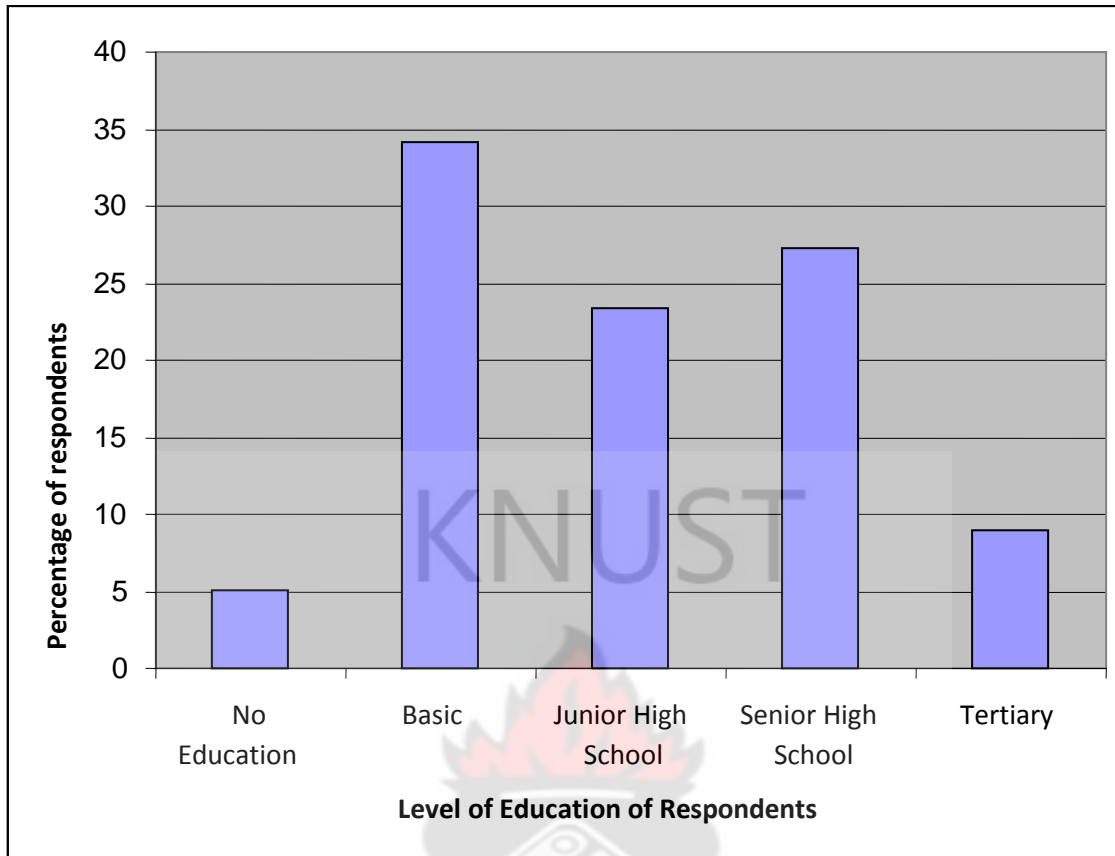


Figure 3 Educational Background of community members

4.4 Benefits Derived from the CGML

4.4.1 Increase in Family Income and development of infrastructure

Results indicate that 13.7% of respondents have secured employment with the CGML. while 86.35 are not directly employed. Out of the employed, majority (67.31%) has been with the company since it started. Over twenty three percent (23.08%) of the workforce has worked in the company for less than 3 years, whilst 7.69% and 1.92% have been with the company for 3 and 5 years, respectively and indicated an enhanced income since securing employment with the CGM, provision of infrastructure e. g. an upgraded health center, schools (plate 2) and market center (plate 3).



Plate 2: Handing over ceremony of a newly constructed six-unit classroom block with offices and library for the Paboase Community in the Chirano Gold Mines Limited Concession Area

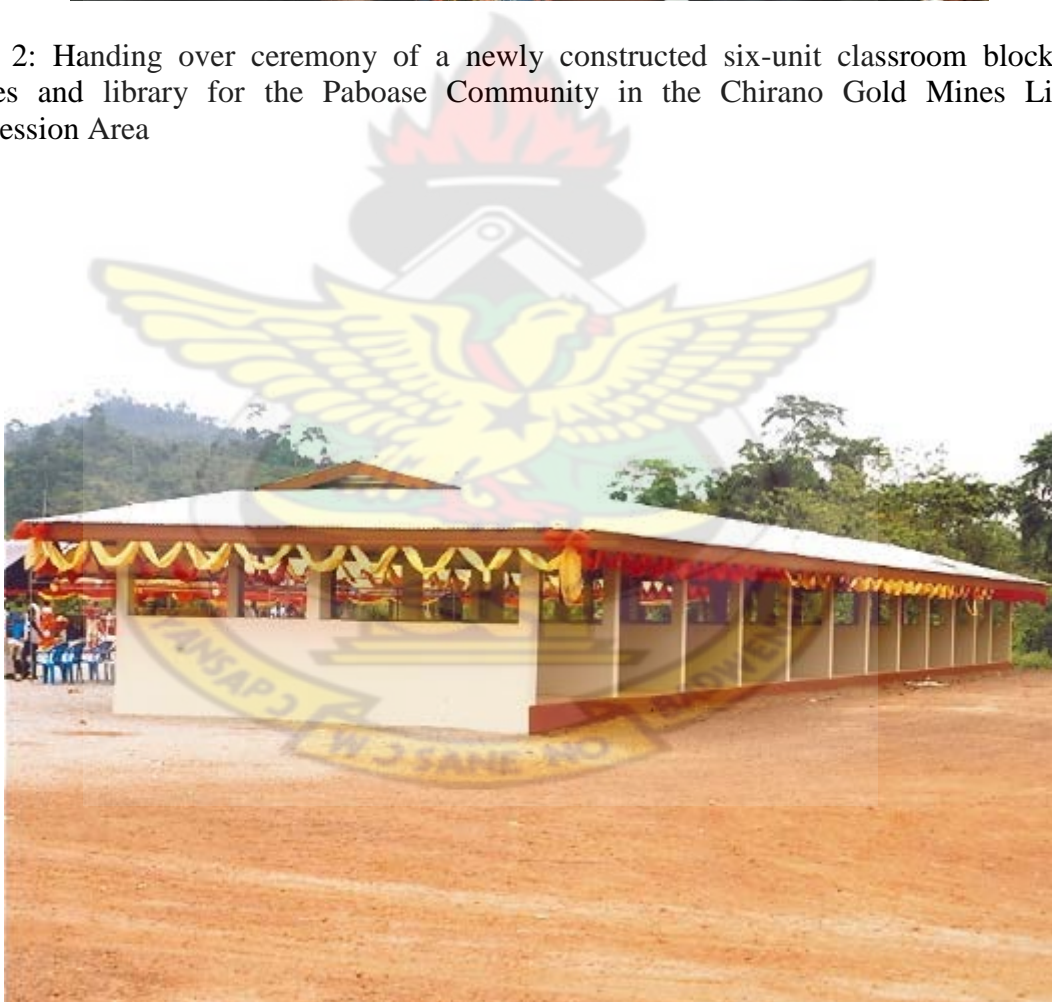


Plate 3 .A newly Constructed market centre for the Akoti and etwebo Communities in the CGML Concession Area



Plate 4a The old bridge on the Chira River in the CGML Concession Area



Plate 4b A Newly Constructed Bridge on the Chira River in the CGML Concession Area



Plate 5: Researcher and the General Manager commissioning a completed electrification project for the Akoti and etwebo communities in the CGML Concession Area

In addition to these the communities have been provided with boreholes (plate 6) and public places of convenience (plate 7).



Plate 6: a Borehole Facility for being commissioned by the Akoti Community in the CGML Concession Area



Plate 7 A newly Constructed 12-seater Aqua privy for Etwebo Community in the Chirano Gold Mines Limited Concession Area

The award of scholarships to students and pupil of the communities in the CGML concession Area was also noted by respondents.

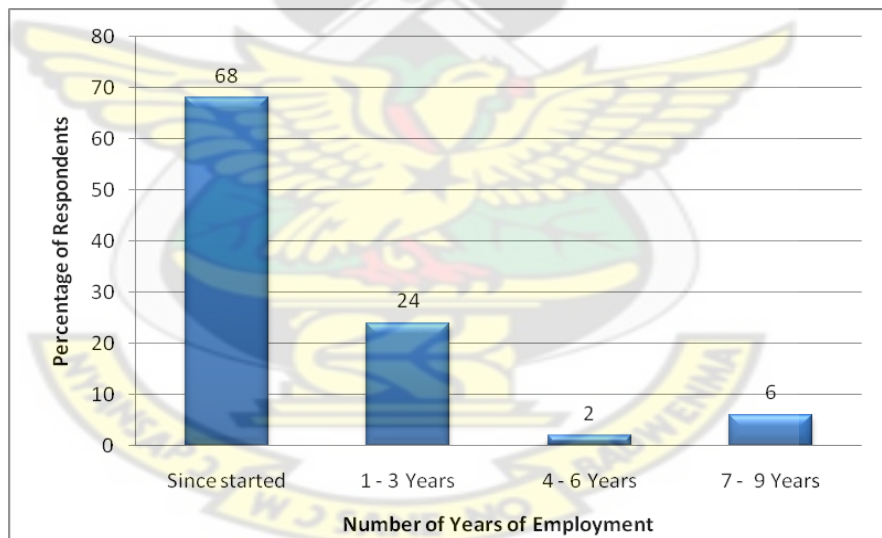


Figure 4 Distribution of number of years of employment

4.4.2 Principal source of information about CGML

Respondents obtain information about the CGML through various sources. The main ones are the media, Ex-employees (24%) and Radio and television News (16.7%), Service Providers, Radio and Television advertisement and Visit to the Mine (figure 5).

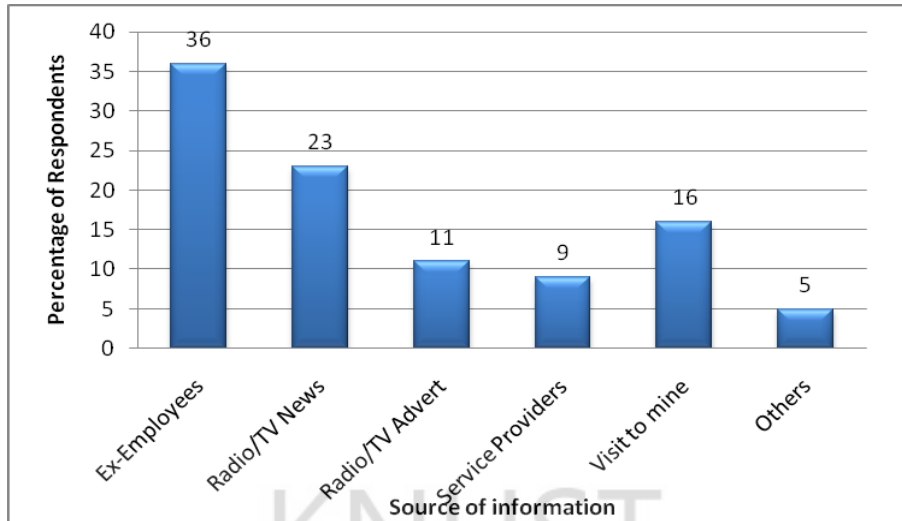


Figure 5 Principal source of information about CGML

4.4.3 Number of years of habitation

Respondents have lived in the mining communities for periods ranging from one year to more than ten years (exploration period inclusive). Ninety percent (90%) of respondents, forming a greater majority had lived in the communities for ten years or more (figure 6).

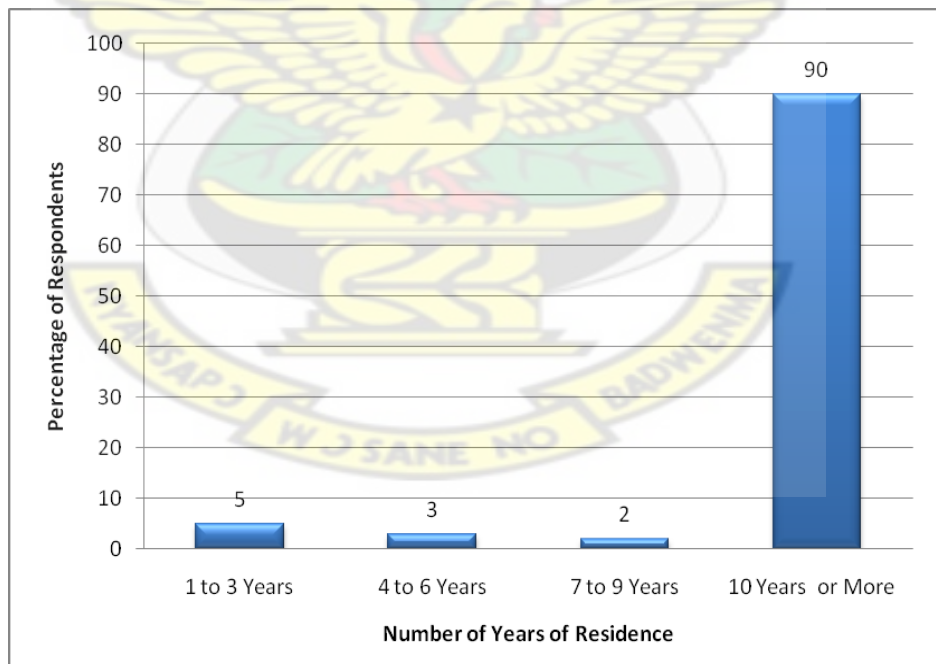


Figure 6 Distribution of number of years of habitation by respondents

4.5 Effects of the Chirano Gold Mine Limited on farming and housing in the Chirano Mine Communities

4.5.1 Inadequate Housing

Respondents from the district assemble indicated that the CGML is among the mining companies that have led to the displacement of a total of five villages and hamlets. This has occurred in the period between 2005 and 2010. The affected people were either relocated or resettled by the mining company or migrated in search of farmland somewhere else.

4.5.2 Accessibility of farmlands and roads

Thirty-two percent (32%) of respondents noted that the mining activities obstructed the smoothness of accessibility to their farms. As a result of this, carting or transportation of their produce from the farms to the communities was quite difficult. The obstructions were such that the routes that linked the communities to their farms were either severely eroded or rendered waterlogged as a result of overflowing banks or expansion.

4.5.3 Environmental and Health Impact

One main problem of water pollution was noticed in CGML mining area. This was siltation through increased sediment load. With the exception of a few respondents (7%), who described the area as pollution-free, majority (93%) were of the view that area is quite polluted and attributed the observation to the existence of the CGML.

4.6 Challenges faced by the Chirano Gold Mine Limited in meeting the expectations of the people its fringe communities

Majority of respondents (79%) noted environmental degradation as a major dissatisfaction resulting from the activities of the mining company. They also reported lack of appreciable

openess of the company to the communities. Lack of understanding of the skill requirement of some jobs which are mostly driven by acquisition of higher education has actually limited the possibility of some members of the fringing communities from securing job with the company.

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CHAPTER FIVE

DISCUSSION

5.1 Gender of Respondents

Results of the study indicate 62 males (representing 80.5% of the male respondents) and 34 females (representing 46.6% of the female respondents) of respondents from Paboase, Akoti and Etwebo whose farm lands have been taken over by the CGML. This proportional distribution of farm lands ownership prior to the acquisition by the CGML may be attributed to culture of the communities that enjoins the males to assume headship of families and therefore hold in trust assets of the families especially lands. This observation corroborates with that by Masterson (2007) who noted that in many parts of the world women have the least probability of owning land.

5.2 Age Distribution of Respondents

Quite a large proportion of the respondents were in the active population range, an indication of active workforce. The respondents were of a fairly young workforce, with the majority of the workforce nimble with a high degree of physical disposition to undertake strength-driven activities. Uddin (2008) notes that the age of an individual is a crucial factor in determining his or her ability to perform a job, suggesting that there is the tendency for younger people to apply their virtues of eagerness, dedication, consciousness and motivation for successful achievement of their set target. Activeness and age exhibit inverse relation. Young and active populations tend to have expectations in life. In the midst of dissatisfaction there is the tendency that some potential factors (e. g. rapid increase in population) will militate against the enhancement of livelihood of community members. Kuhnen (1971) posited that, as in the case of mining communities, sustenance does not suffice. It is therefore not surprising that

respondents especially the youth have actively initiated or supported periodic agitation that the existence of the CGML has rather kept them in the poverty brackets.

The issues of possibility of duplication of efforts and variability in interests by different age groupings can also not be underestimated in the analysis of benefits. This is one of the strong factors that could trigger agitation and in such cases the strongest group usually by virtue of numbers could have the strongest influence. Such instances bring about the perception that could be put as ‘the benefits are not beneficial’

5.3 Education Background

Uddin (2008) has reiterated the consideration of education as the foundation for human qualities. A greater proportion (94.1%) of respondents had some form of formal education ranging from basic education to tertiary education (figure 3). They ranged from the least level, basic education (34.2%) to the highest educational level, tertiary education (9.0%). Asadullah and Rahman (2005) stated that theoretically, education is expected to improve productivity in all spheres of productive activities including agriculture. This suggests that, in the absence of the CGML the communities would be able to make living to some extent.

Educational statuses of respondents were however dominated by basic level education. According to Weir (1999), the potential to secure paid employment or to get self-employed to generate income by the application of skills acquired in school, is a means for greater economic benefits. Education may promote productivity indirectly since it improves the quality of labour. Therefore greater number of years of education gives an indication of farmers’ ability to adopt modern technologies for improved productivity and hence the likelihood to achieve food security (Adebisi, *et. al.*, 2009).

Although respondents had a wide range of education (Figure 3) spanning from primary education to tertiary education, the distribution exhibited inverse relation. That is, the higher the level of education, the lower the number of respondents who had that level of education and vice versa. This could be attributed to lower income level of the community members which, in turn makes it difficult to afford higher education. Another factor that could explain this observation is the occurrence of an apparent attractive illegal mining activity popularly known as 'galamsey'. This means of making money tend to downplay the importance of higher education, the fruit of which, as perceived by the operators, takes too long a time to realize.

For this reason, the dominance of respondents in the basic education category is worrisome, tending to cause anxiety because it places some restrictions and limitations on the spectrum of employment opportunities available to them and also on their ability to understand environmental issues and explain same to others. This could have some effect on the incidence of agitation on environmental issues that are tied to the existence of gold mining companies. This, notwithstanding, the distribution may give an indication of easy communication since every respondent has had an education of some kind with the least being basic education.

5.4 Ways by which the Chirano Gold Mine limited has affected the livelihood of its fringe communities

5.6 The number of years of habitation

Number of years that respondents have lived in the mining communities could have influence on knowledge of the communities' relationship with the mines and for that matter

the authenticity of responses from such people. It was observed in the study that majority (90%) of respondents had lived in the communities for ten (10) years or more (figure 6). This suggests that respondents in this group are more abreast with livelihood issues and can better take advantage of the modern technology including modern implements provided by the CGML through TechnoServe. This is in line with an assertion by Ajewole (2010) that with a greater number of years of experience, a farmer becomes more risk-averse when judging new technology.

5.4.1 Increase in Family Income and development of infrastructure

According to Sahn and younger (2007), the single most important source of data for poverty comparisons and the only index data source used to determine the distribution of living standards in a society is household survey. Results indicate that 13.7% of communities' members have secured employment with the CGML. While 86.35 are not directly employed but are engaged in ventures such as restaurant and shop operation and transport operation, all of which flourish due to the mine. Out of those directly employed, a large percentage of the current workforce (67.31%) has been with the CGML since it started. Workers who have been with the company for less than 3 years were 23.08%, whilst 7.69% and 1.92% have been with the company for 3 and 5 years respectively and indicated an enhanced income since securing employment with the CGML (Figure 4).

The level of education of respondents is also a critical factor that influences the ability of respondents to secure employment and hence improve the income level. According to Falckingham and Namazie (2002), individuals' consumption of food and other services such as education and health are the best indicators of welfare. Majority of respondents indicated their ability to acquire physical assets and have good levels of consumption. Strongman (2008) posited that income level and consumption are the most direct and popular measures

of living standard. ILO (2003) reiterated that cash income forms the bulk of income and is relatively accurate and cheap hence the most frequently used.

Apart from direct infrastructural development such as schools, upgraded health centres, boreholes, roads, markets canters, electricity, and offer of scholarships to the local people by the CGML, it contributes greatly by providing stimulus to the economic development of the two districts by the payment of taxes for the development of such infrastructural. However, only 14.9% of respondents are aware of this. This therefore suggests that there is a communication gap between the CGML and the communities.

5.4.2 High Cost of Living

One of the known, negative effects of mining is the high cost of living within communities near mine locations. All the indices-food, health, population growth, accommodation, water, etc that make a decent life have a price tag beyond the reach of the average person. At the same time, the traditional sources of recreation and livelihood of the people are seriously impaired by mining activities, a situation that sparks off or aggravates other social problems. Two main factors are responsible for the high cost of living within mining locations.

First, there is the disparity in incomes in favour of mining company staff. For example, the salaries of a Ghanaian staff in the mines are indexed to the US dollar, which raises their income far above the other community members. In addition the expatriate staffs of the mines are paid internationally competitive salaries, which further widen the income disparities in these mining locations. This group of high- income earners has thus influenced the pricing of goods and services such as housing, food and other amenities. Secondly, the mining industry has withdrawn a significant percentage of the labour force from agricultural

and other income- generating activities by taking farmlands away and holding out the false promise of employment.

The fall in food production in the communities within CGML concession areas that is already densely populated, with high unemployment rate, accounts for high food prices. Akabzaa and Darimani (2001) pointed out that the decrease in food in some mining communities with relatively high unemployment rate accounts for the high prices of foods. The harsh economic conditions have also pushed children of schools-going age into menial jobs at the expense of their education. A Child labour and high school dropout rate is notable in these mining communities.

5.5 Sources of information about the CGML

Majority of the respondents (99%) obtain information about the CGML from ex-employees, Radio and television News, Service Providers, Radio and Television advertisement and Visit to the Mine while only a few (11%) obtain this information from visiting the mine. This could explain the observed agitation by the youth since they could hardly become aware of the developed programmes, some of which relate to availability of employments and efforts at reducing environmental impact. As the programmes are somehow unknown and the issues are of high relevance to the population, the principal demand for information always comes back to the same point: what is CGML doing to minimize the environmental impact of its activity. Boon and Ababio (2009) revealed that local communities place their hopes and expectation on mining companies right from the onset of their establishment with the aim of exploiting them in the area of infrastructure and other resources. It is therefore not surprising that the youth perceive the performance of the CGML as unsatisfactory

5.7 Effects of the Chirano Gold Mine Limited on farming and housing in the Chirano Mine Communities

5.7.1 Inadequate Housing

Downing (2002) reported that displacement involves not only the physical eviction of people from a dwelling, but also the expropriation of productive lands and other assets to make possible an alternative use. Respondents from the District Assemblies indicated that the CGML is among the mining companies that have led to the displacement of a total of five villages and hamlets. This has occurred in the period between 2005 and 2010. The affected people were either relocated or resettled by the mining companies or migrated in search of farmland somewhere else or were. Aubynn (2003) recounted that substantive alienation also involves forcible surrender of local resources for developmental purposes. Resource alienation in Ghana has led to high rate of loss of community land, unemployment, and conflict with mining companies.

The conventional factors of production; land labour and capital are able to provide people in farming communities with sustenance especially where the population is not dense. However, if appreciable and rapid increase in population is expected as in the case of mining communities, they do not suffice (Kuhnen, 1971). This is particularly so with land and population increase. Where population increases beyond a particular level, especially where technology base is low, the land might not be able to produce enough to enable the farmers enjoy a sustainable livelihood.

Land remains a key factor in economic development and is still a principal source of livelihood of the vast majority of Ghanaians of which the people of Chirano are no

exception. Depriving people of this valuable resource due to the exploitation of minerals as is happening in various parts of the country, limits opportunities for economic and social progress for the disadvantaged parties (Aryeetey *et al.*, 2007) Livelihoods of such people might not be guaranteed

5.7.2 Accessibility of farmlands and roads

The study noted that mining activities have caused severe eroded or waterlogged conditions in the farm routes in the mining communities. In most mining communities, the environment is undergoing rapid degradation. The other equally serious consequence is that environmental degradation is not treated as a cost and therefore reflected as a loss to the economy. By undervaluing the contribution of the environment and ignoring the costs of degradation, policies are formulated that end up promoting environmental degradation. Also inadequate funds are invested to support sustainable utilization and protection of the environment and natural resources (Moyini *et. al*, 2001). Agricultural lands are not only generally degraded, but the decrease in land for agricultural production has also led to a shortening of the fallow period. The traditional bush fallow system, which adequately recycled substantial amounts of nutrients and made the next cycle productive, can no longer be well practiced in the communities within the CGML area of operation due to inadequacy of land. Large scale mining activities generally continue to reduce vegetation to levels that are destructive to biological diversity.

5.8 Environmental and Health Impact

The principal elements of the environment land, water and air have been severely impacted by mining operations. The continued viability of these elements to support the well-being and development of the rural populations in this mining community is currently in doubt.

Four main problems of water pollution were noticed in CGML mining area. These are chemical pollution of ground water and streams, siltation through increased sediment load, increased faecal matter and dewatering effects.

5.8.1 Air pollution

The indication by respondents that the study area is polluted corroborate with a study by Ntim (2011) which suggests that a comparison of the concentration of particulate matter are with that of the WHO standards indicates that the area is polluted. However in terms of the EPA- Ghana standard, the converse statement is true, thus, the study area is unpolluted. This could be due to the relatively strictness of the WHO standard which is probably unrealistic due to the economic benefits of Gold mining processes in Ghana.

5.9 General Impression about the CGML

Over forty- five percentage (45.2%) of respondents gave a positive impression (7 points on a scale of 10 points) about CGML while about twenty-three (23.4%) gave a negative impression about the company. The reasons behind this score, as indicated by respondents, were factors such as employment of the local community. The principal positive points perceived in CGML were the generation of jobs (56.7%) and the stimulus to the economic development of the two districts through the payment of taxes (14.9%). On the other hand, the principal negative point perceived in the company are related to the environment impact caused by its activity, the most cited being air pollution (35.6%) and environmental degradation (33.5%)

5.10 Challenges faced by the Chirano Gold Mine Limited

Respondents observed environmental degradation and lack of openness of the company as the two weak points that obscure the image of the Chirano Gold Mine Limited. The combine

effect of these two problems is that knowledge about the programs developed by Chirano Gold Mine Limited to minimize the environmental impact are, in a general manner, still little known to the population. The issue of the environmental impacts points to a weak point of CGML. The absence of a communication policy that seeks to inform the population about its activities and actions of social / environmental responsibility for example, the disclosure of more jobs generated by the expansion of the mine, has been a major problem to deal with. The sources of information about the company are the media and its internal public (employees, ex-employees and service providers). The lack of a communication policy makes CGML vulnerable to any news published about it. It is therefore not surprising that the CGML is viewed by respondents as a “closed” company, which does not speak about itself.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The image of the company is sustained basically by the social responsibility, associated principally with the generation of jobs and the promotion of the economic development of the city. Majority of respondents indicated that the existence of the mining company has impacted positively on the Chirano community through employment and the general development. The CGML has contributed both directly and indirectly through provision of stimulus to the development of infrastructural development such as schools, upgraded health centre, boreholes, roads, markets canters, electricity and offer of scholarships to the local people. However, the population being a fairly young workforce, and therefore exhibits higher expectations in life could be the reason for the unsatisfactory perception by the fringing communities.

The majority of community members having the basic education as the highest educational level limit the extent of employment by the CGML since most jobs in the company have job requirements that are usually acquired at levels beyond the basic education. This notwithstanding, 13.7% of communities' members have been employed directly by the CGML while 86.35% of those who are not directly employed are engaged in ventures such as restaurant and shop operation/trading and transport operation, patronized and promoted by the existence of the mines. Majority of respondents indicated their ability to acquire physical assets and have good levels of consumption.

Like other mining communities, cost of living reflected in the indices-housing, food, health, population growth, accommodation has gone up since the beginning of mining in the communities. However disparity in incomes, that enables community members to cope with the high living standard, favours those who have gained employment with the mining company.

General environmental degradation has occurred due to the existence of the mines. These include destruction of farm routes in the mining communities and pollutions of air. Agriculture farmlands have been lost by some community members to the mines and the few left are degraded. The communities have responded to this by shortening the fallow period. The situation has worsened the plight of the community members since this implies decrease in productivity. Greater proportions of males have had their lands taken over by the CGML than females possibly due to the culture of the communities that enjoins the males to assume headship of families and therefore hold in trust assets of the families especially lands.

There appears to be a wide communication gap between the CGML and the communities obscuring the image of the mining company and hence weakening the mutual co-existence

of the Chirano community on one hand and the Chirano Gold mines Limited on the other hand.

6.2 Recommendations

Chirano Gold mining Company Limited should adopt a more aggressive communication policy. Thus, there should be more regular meeting with the various communities to solicit their problems and discuss them in order to find the common ways forward. This would bridge the communication gap and strengthen the mutual and harmonious co-existence between the mining company and the communities. The ultimate result would be an enhanced, satisfactory relation and consolidated image of Chirano Gold mining Company.

Mining companies including the CGML should make it their policies to provide operational plans in their various operational communities. This should include information of communities about the period of operations when mining operations in certain areas in their concessions would take place and when they would end. Results of water and air qualities in the CGML operational area should be published in its quarterly news letters and distributed to stakeholder to allay the fear of the community members and demonstrate the environmental stewardship exhibited by the company.

Mining companies should provide extension services to communities' members in order to effectively utilize and maximize the available farmlands. This would, in turn, enable farmers to increase productivity. In this bid, extension education should prominently feature, because of the key role education plays in adoption of innovation. This may be done by intensifying education with emphasis on the concept of productivity and the need to meet the associated

challenges with innovations. This should be vigorously pursued because it is an indispensable tool in changing ways of getting things done.

Calling people to come and listen to what you have for them itself need education.

Mining communities should be encouraged by the mining companies to form associations to champion the course of farmers. Most often, it has been the practice that opinion leaders who enter into negotiations with mining companies on issues concerning these farmers. The possibility has always been that, the issues of negotiation might not be well understood by the opinion leaders and hence might not be satisfactorily done in the interest of the farmers. These have sometimes brought the persistence of agitation by mining communities despite an already occurred negotiations.



REFERENCES

Adebayo, S., Oluyole, K. A. and Fagbami, O. O. (2009). An Assessment of Gender Involvement in Crop Production: A case Study of Kola Production in Osun State, Nigeria. *Int. J. Sustain. Crop Production*. Vol. 3(3):8 - 11

Ajewole, O. C. (2010) . Farmer's Response to Adoption of Commercially Available Organic fertilizers in Oyo State, Nigeria. *African Journal of Agricultural Research* Vol. 5(18): 2497-2503

Akabza, T. and Darimani, A. (2001). Impact of Mining Sector Investment in Ghana: A Case Study of the Tarkwa Mining Region. A Draft Report Prepared for Structural Adjustment Participatory Review Initiatives (SAPRI). pp 7 – 59. [Http://www,sarprin.org/ghana/research/gha_mining.pdf](http://www.sarprin.org/ghana/research/gha_mining.pdf) accessed 29th June 2011)

Akosa, A.B., A.A. Adimado, N.A. Amegbey, B.E. Nignpense, D. Cardoo and S. Gyasi, (2002). Report on Cyanide Spillage. Cyanide Investigation Committee, Ministry of Environment and Science, June.

Anglogold Ashanti's Environmental Department (2008), Test Results of Polluted Rivers and Waterbodies 2000-2008, unpublished.

Asiamah, J. (1983). Rural Land Economy in Ghana – The Issues and the Opportunities. Publisher Unknown

Aubynn, E. A. (2003). Community Perceptions of Mining: An Experience from Western Ghana. Master of Science Thesis in Earth and Atmospheric Sciences, University of Alberta, Edmonton, Alberta university. 174 pp. http://www.minerals.org.au_data/assert/pdf_file/0014/10076/Aubynn_Emmanuel9A3.3pdf (accessed 6th January, 2011).

Babut, M. & Sekyi, R. & Rambaud, A. & Potin-Gautier, M. & Tellier, S. & Bannerman, Boon, E. K. and Ababio, F. (2009). Corporate Social Responsibility in Ghana: Lessons from the Mining Sector. 'IAIA09 Conference Proceedings', impact Assessment and human Well-Being, 29th Annual Conference of the International Association for impact Assessment, Accra, Ghana pp 1-6. http://iaia.org/iaia09ghana/.../Cs41_Boon&AbabioGhanapdf (accessed 4th March 2011).

Carney, D. 1998. Implementing the sustainable rural livelihoods approach. Paper presented to the DfID (Madigan, 1981).

Diaw, K., Blay, D., and Adu-Anning, C. (2002). Socio-Economic Survey of forest fringed Communities: Krokosua Hills reserve. Consultancy report Submitted to the Forestry Commission of Ghana, Accra. 82 pp

Dörner, G. (1972). Sexualhormonabhängige Gehirndifferenzierung und Sexualität.

Downing, T. E. (2002). Avoiding New Poverty: Mining-Induced Displacement and Resettlement. Mining, Mineral and Sustainable Development (MMSD) Working Paper No. 58. Institute for Environment and Development (IIED), London, United Kingdom. 29pp.

Gambrah, A (2002), Improving Land Transfer Procedures in Ghana, Journal of the Kwame Nkrumah University of Science and Technology, Kumasi, Vol. 22, Nos. 1,2 & 3 pp.22-33

Ghana Chamber of Mines, (1998). Annual chamber of mines report: Accra, Ghana.

Ghana Minerals Commission, (2000). Statistics on Ghana's mineral exports (1997-99):
Accra, Ghana Minerals Commission.

Ghana. TUC/Fredrich Ebert Foundation - Gold Type Publishers Ltd, Accra

Goudie, A. (2006). Global Warming and Fluvial Geomorphology. *Geomorphology*. (79). 3-4. 384-394.

Graham, R. (1982) The Aluminium Industry and the third World: Multinational Corporations and Underdevelopment. Zed press London).

Hilson, G. and Potter, C. (2005). A Contextual review of The Ghanaian Small-scale mining Industry. Mining, Mineral and Sustainable Development (MMSD) Working Paper No. 76. Published by the International institute for Environment and Development (IIED), London, pp 1 – 29. <http://www.pubs.iied.org/pdfs/G00722.pdf> (accessed 3rd September, 2010)

International Labour Organization (ILO) (2003). Household Income and Expenditure Statistics. Seventeenth International Conference of Labour Statisticians. Report II. Published by international Labour Organization. pp 1-94
<http://www.ilo.org/public/english/bureau/stat/download/17thic1s/r2hies.pdf> (accessed 11th August, 2010).

Kortatsi (2004) Determination of the Concentrations of Physicochemical Parameters in Water and Soil from a Gold Mining Area In, Ghana

Kuhnen, F. (1982). Man and Land: An introduction into the problems of agrarian Kwame Nkrumah University of Science & Technology (KNUST), Kumasi. Vol.

Lawrence, J & Singh, N. 1997. Productive employment and poverty eradication, how can livelihoods be more sustainable? United Nations Development Programme Background Note, February 25.

Madigan RT (1981). Of minerals and man. Australasian Lust. Mag and Wetportville, Australia, p. 138.

Masterson (2007), Masterson, Thomas, 2007. Land Rental and Sales Markets in Paraguay. Working Paper 491. Levy Economics Institute, Annandale on Hudson, NY

Masterson, T. (2007) Female Land Rights, Crop Specialization, and Productivity in Paraguayan Agriculture. Working Paper No. 504. the Levi Economic Institute of Bard College, Annandale –on-Hudson, New York. 27pp.
http://www.leviinstitute.org/pubs/wp_504pdf (accessed 19th February 2011).

Ntibery B.K. (2004-09-09), District Officer of Small Scale Mining, district center, Minerals Commission.

Ntibery, B.K., Atorkui, E. & Aryee, B.N.A. (2003), Trends in small-scale mining of precious minerals in Ghana: a perspective on its environmental impact. Journal of Cleaner Production 11:131-140

Rennie, J.K. and N. Singh. Participatory Research for Sustainable Livelihoods. Winnipeg: IISD, 1996.

Sahn D. E. and Younger, S. (2007). Living Standard in Africa. Strategies and Analysis for growth and Access (SAGA). Working Paper. Project of Cornell and Clark Atlantic University. United States Agency for International Development (USAID).

Saigo B. W. and William P. C. (1992). Environmental Science- A global Concern. WM, C. Brown Press.

Songsore, P. W. K. Yankson and GK Tsikata, (1994), Mining & the Environment: Towards a Win-Win Strategy a study of Tarkwa- Aboso.

Springer-Verlag, Wien, New York (Coomson, 2003), Minister calls for increase in mineral royalties to support community projects, The Ghanaian Chronicle, accessed November 2, 2004, at URL <http://www.ghanaian-chronicle.com/231203/page2g.htm>.

Strongman, J. (2008). Gender Mainstreaming in the mining Sector and Mining Communities. Mining, gender and Sustainability Workshop jointly organized by the Australian National University and the World Bank (6th and 7th November, 2008). Research School of Pacific and Asian Studies, Australian national University (ANU), Canberra.

http://empoweringcommunities.anu.edu.au/documents/JStrongman_The%20Case%20for%20GM.pdf (accessed 5th April 2011)

Tsikata, F. S. (1997). The vicissitudes of mineral policy in Ghana, Resource Policy, 23, 9-14.

Uddin, M. M. (2008), Credit for the poor: The Experience of rural Development Scheme of Islamic bank Bangladesh Ltd. Journal of Nepalese business Studies Vol. 5 (1): 62 – 75.

W. & Beinhoff, C.(2003), 'Improving the environmental management of small-scale gold.

Walde T. (1983), permanent sovereignty over natural resources, recent developments in the mineral sector. Natural resources forum July 1983

Yin, Robert K. (2003a). Case study research, design and methods (3rd ed., vol. 5). Thousand Oaks: Sage. Quantitative Social Research.

APPENDIX I : SAMPLE OF QUESTIONNAIRE

KWAME NKRUMAH UNIVERSITY OF SCIENCE & TECHNOLOGY, KUMASI

DEPARTMENT OF MATERIALS ENGINEERING

QUESTIONNAIRE FOR HOUSEHOLDS

The questionnaire is a research instrument for my master second degree thesis on cost benefit analysis on the existence of Chirano Gold Mines Limited and it is for academic exercise. All information collected will be used solely for the purpose for which it is intended.

1. Locality

2. Respondent;

Name.....

Title.....

Date and Time of Interview.....

3 Size of household

A 1-4

B 5-9

C 10-14

D 15-19

E 20 or above

4. Have you received any formal education?

a. None

b. completed Primary School

c. completed JHS/Middle School

d. completed SHS

e. completed tertiary institution/Teacher Training College

f. other specify

5. Where do you come from

6. For how long have you lived in this community?

7. Before the introduction of mining in the community, what did you do for a Living?

a. farming

b. trading

c. hunting

d. others (specify)

8. For how long have you been engaged in this activity

9. If farming, which crops did you cultivate (state in order of priority)

1.....

2.....

3.....

4.....

10. How much did you earn from the farming activities.
11. What is the size of the land you cultivated?
- a. 0 - 4 hectares b. 5 - 9 hectares
- c. 10 - 14 hectares d. 15 - 19 hectares
- e. 20 hectares and above
12. When was mining introduced in your community
13. What happened to your land due to mining in the community?
- a. Completely taken b. Partially taken c. Not taken
14. If partially taken, how many hectares did you lose to the mining activities?
.....
.....
15. When did you hear your land was to be taken for mining activities?
- a. before the introduction of the mining
- b. after the introduction of the mining
- c. Others specify.....
16. Were you given anything for losing your land?
- a. Yes b. No
17. If No, why were you not given any compensation
18. If yes, how much were you given as compensation
19. Who determined the compensation to be paid?
- a. by the company b. by the farmers
- c. by the company and farmers d. Others specify...
20. Do you know how the compensation was determined?
- a. Yes b. No
21. If yes what criteria was used in determining the compensation
- a. the size of the land

31. Has the introduction of mining made any positive contribution to the community?

- a. Yes b. No

32. If No, explain

33. If Yes, what are some of the contribution

A extension of electricity to the community.

B provision of good drinking water

C provision of school infrastructure and facilities

D others specify

34. Do you think the activity you are engaged in is sustainable?

- a. Yes b. No

35. If yes what makes you think it is sustainable.....

36. If No, explain

37. What do you do with the money you receive from the activity?

- a. take care of my children in school
b. reinvest the money in my business
c. deposit the money in my account
d. Others specify

38. Has the introduction of mining activities in the community created any problems?

- a. Yes b. No

39. If yes, what are some of these problems?

- a. water pollution
b. Noise pollution
c. Land degradation
d. others specify.....

40. What social problems are created as a result of the introduction of mining activities in the community?

- a. general state of insecurity
b. high food prices
c. high incidence of diseases
d. stealing

e. prostitution

e. others (specify)

41. What steps are being taken to address these problems?

.....

42. What do you suggest should be done to reduce the effect of mining?

.....

KNUST

