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STUDY REPORT ON

RESOURCE EXTRACTION AND SUSTAINABLE DEVELOPMENT OF MINE-TAKE COMMUNITIES IN GHANA

GGA
Good Governance Africa

RESOURCE EXTRACTION AND SUSTAINABLE DEVELOPMENT OF MINE-TAKE COMMUNITIES IN GHANA

SUBMITTED TO

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About Good Governance Africa
Founded in 2012, the Good Governance Africa is a registered Not for Profit Organization (NPO) with centers in Accra, Ghana covering Anglophone West Africa except for Nigeria which has an independent center in Lagos. For Southern Africa, GGA has centers in Johannesburg, South Africa and Harare, Zimbabwe. New centers have been opened at Goree Institute in Dakar, Senegal to cover Francophone West Africa and Addis Ababa, Ethiopia called the AU Centre.

Good Governance Africa aims to promote good governance in Africa through applied research and critical debate (advocacy). Our publications include Africa in Fact, the African Survey and other projects. Research areas include local governance, land and natural resources, early childhood education and national security. GGA West Africa is also concerned with the promotion of local economic development, urban governance, right to information, justice and accountability, innovation, environmental sustainability (including climate change issues) and leadership.

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List of Acronyms

AMV	African Mining Vision
DMTDP	District Medium Term Development Plan
DSA	Daily Subsistence Allowance
EITI	Extractive Industries Transparency Initiative
GDP	Gross Domestic Product
GGA	Good Governance Africa
GoG	Government of Ghana
GSS	Ghana Statistical Service
KPCS	The Kimberley Process Certification Scheme
LULC	Land Use and Land Cover
MoU	Memorandum of Understanding
NADeF	Newmont Ahafo Development Foundation
NGGL	Newmont Ghana Gold Limited
PWYP	Publish What You Pay
SDGs	Sustainable Development Goals
SUV	Sports Utility Vehicle
UENR	University of Energy and Natural Resources
UNDP	United Nation+s Development Programme
UNEP	United Nations Environment Programme

Executive Summary

Mining is an important economic activity for many developing countries, especially mineral-rich countries whose economic activities are largely natural resources dependent. The mining sector plays a significant role in revenue generation, local infrastructure and economic development, employment generation as well as livelihood improvement in many resource dependent countries. Due to the importance of mining, the last few decades have witnessed a dramatic growth in mineral prospecting and development, particularly, across the developing world.

Meanwhile, mining is generally perceived as destructive, and a usurpation of communal resources for corporate and individual benefits. There are polarized views about the benefits and burdens of mining to mine-take communities. For many an observer, mining is bad for development. Mines have often been associated with appalling labour conditions, unequal distribution of wealth and unsustainable patterns of development and growth.

There has therefore been the need to conduct empirical studies to truly unpack the connections between natural resource extraction and the development of mine-take communities, particularly in the wake of 'resource curse', 'Dutch-disease' and 'rentier state' discourses. Generally, however, such studies have tended to focus on resource rich areas in the global north to the neglect of resource rich areas in the global south. However, given Ghana's stable democracy, its enviable position as currently the largest producer of gold on the continent, where mining is described as an ancient industrial activity, it is important for studies like this to understand how our democratic institutions are helping us navigate the resource curse or otherwise.

This study is therefore one attempt by Good Governance Africa to unpack this rather contested and ambiguous territory, particularly as it relates to African communities, using the Ahafo area, where Newmont Goldcorp operates a major concession as a case. The choice was grounded on the fact that the Ahafo area, and Newmont's operations have received commendable reviews from sustainability watchers to warrant an empirical assessment. The lessons may be relevant for other industry actors and national policy makers, if they are proven to be sustainable and enduring.

The study employed mixed methods research approach and collected data from the five main mine-take communities within the catchment of the operations of Newmont Goldcorp. Primary data was also collected from the District Planning Officer and the District Directorate of Agriculture. Efforts to interview staff of Newmont Goldcorp and Newmont Ahafo Development Foundation proved futile as requests and reminders sent to them to seek permission for the purpose, received no responses. Any attributions made either to Newmont Goldcorp or Newmont Ahafo Development Foundation are therefore culled from secondary data sources and reports available online or anecdotal.

The study has established that the widely researched resource curse has no bearing in relation to the Ahafo area and the operations of Newmont Goldcorp. Food production is doing well, there is increasing revenues for the local government, there is access to information, voice and accountability, and conservation of environmental and cultural resources. Meanwhile some concerns exists in relation to dust pollution, health and safety, acid rains, effects of blasting on buildings, and the long-term impacts of the mining operations on the health and safety of the inhabitants.

This study established, that the operations of Newmont Goldcorp can serve as a learning platform for government and policy makers to reform mining regulations and revise leases to incorporate the sustainability practices of Newmont in all mining leases. This will ensure that mining is made beneficial to the people of Ghana.

Acknowledgements

The Good Governance Africa (GGA) West African Regional Office (WARO) is particularly grateful to the Research Team from the University for Energy and Natural Resources (UENR) for its exceptional commitment to completing this research on time and within budget. To the lead researcher, in the person of Dr. David Anaafo, the Centre is impressed with your dedication and detailed delivery of GGA assignments over the years. To the two research assistants from UENR in the persons of Dr. Ricky Nutsubgodo and Mr. Daniel Adusu, we say "ayekoo".

To the chiefs and community leaders in the five selected mine-take communities in the Asutifi North District of the Ahafo Region who availed themselves at various stages of the report development, the Centre is very much appreciative of your support. A big thank you also goes to the District Chief Executive (DCE), the Dictrict Coordinating Director (DCD), the District Development Planning Officer (DPO) and other officers of the Asutifi North District Assembly (ANDA) who in various capacities assisted GGA-WARO and the Research Team in excuting this all important assignment.

Finally, to GGA-WARO's ever reliable research and monitoring team led by Mr. Edward Teye Sarpong and Mrs. Gifty Adjei-Kumi respectively, the Centre is proud of your achievements and looks forward to the effective use of the findings and recommendations in this report to enrich debate on sustainable mine exploration and community development.

Tina S. Asante-Apeatu
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Foreword

The Good Governance Africa (GGA) Centre is committed to promoting governance principles that have the potential of liberating the poor and the marginalized in society by creating sustainable livelihoods for the masses. As part of the strategic direction for the Centre's West African Office in Accra, Ghana, four key areas including natural resource conservation, protection and utilization have been identified as critical areas of entry for national, district and community development. Ghana like most developing nations endowed with natural resources such as gold have had a rather unfortunate tale to tell when it comes to the visible improvements the country has received from the exploration of this natural resource. After centuries of gold mining, the debate still rages on as to whether there is a positive

correlation between gold mining and the socio-economic liberation of mine-take communities and the country as a whole.

GGG-WARO's work in the natural resource sector is therefore pertinent to charting a progressive path of re-writing the negative history of gold exploration and the seeming lack of direct or indirect benefits that warrants such expensive ventures. Whilst there exist myriad expamples of how devastating Ghana's gold mining ventures have been to mine-take communities, the forest reserves and water bodies, there seem to be a good number of examples of best practices in the sector as well. This study on the operations of Newmont Goldcorp and the development of mine-take communities in the Ahafo Region (Asutifi South District to be specific), is one such good case of how mining and community development can be interlinked. That is not to say all is good in terms of development of the communities in the said district, but rather to draw positive lessons from some of the good initiatives Newmont Goldcorp and its stakeholders are embarking on.
Notable policy pointers from the Asutifi North District in terms of gold mining and sustainable development include:

- The need to address the significant implications of the considerable quantum of youthful population without gainful employment.

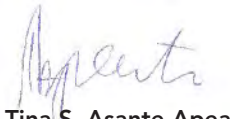
- Implications of the majority of workforce (90%) in the informal sector of the economy.

- Complaints of environmental impacts of the mine operations with respect to the blasting of rocks (with effects on buildings), dust pollution, acid rains and water pollution.

- Over dependence on rainfall for farming and related activities which limits continuous production of food crops and threatens food security in the area.

The relationship between the Newmont Goldcorp and the mine-take communities if enhanced could be a good example for future mine concessions and operations in Ghana and the West African Region. Increasing funds to the local authority (Asutifi North District Assembly) from mine proceeds in the form of royalties and from taxes or rates

from businesses set up in the area to serve the mining industry is a positive development. Such revenues however, should be channeled to areas within the society that will trigger sustainable job creation and socio-economic development of the communities. The establishment of the Newmont Ahafo Development Foundation by the mining firm in partnership with the chiefs and people is a worthy course of action. The Foundation's development footprints in the area could help re-write the development story of the district if interventions are well coordinated and executed. The notable gains on land reclamation and reafforestation in the area is a positive example for environmental sustainability and climate change adaptation. It should be replicated in other mining areas within Ghana and the sub-region.



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Chapter 1
INTRODUCTION

1.1 Background and Rationale for the Project

Mining is an important economic activity for many developing countries. It is the second oldest and fifth-largest industry in the world and continues to play a vital role in international trade and economic development. Mining supports economic development by providing income from tax revenue, foreign exchange earnings, and local sales for infrastructure development (Amponsah-Tawiah and Dartey-Baah, 2011). Mining also contributes to livelihood improvement and poverty alleviation by generating direct and indirect employment for people of the mine-take communities and beyond (Amponsah-Tawiah and Dartey-Baah, 2011; Ushie, 2017). Wilson et al. (2015) reported that more than 100 million of the world's population, depend directly or indirectly on artisanal mining for their livelihoods.

Due to the importance of mining, the last few decades have witnessed a dramatic growth in mineral prospecting, development, and foreign direct investment in the mining industry particularly, across the developing world (Bebbington et al., 2008). This is perhaps due to admonishments by the World Bank and its allied institutions to developing countries to pursue extractive industry-led growth as a development strategy (Campbell, 2009). The results have been the recalibration of the mining and investment codes of about 90 countries (Bridge, 2004) and an accompanying positive mining industry response, leading to significant increases in mining investments.

However, the high environmental, health, and safety standards in western countries make them unattractive destinations for mining investments. Africa has therefore become the most preferred destination for mining investors as apart from hosting the world's largest reserves of mineral resources, environmental, health, and safety standards are relatively low compared to the global north.

Apart from these foreign investments in the mining sector of Africa, thousands of unemployed local people use primitive extraction techniques, with dynamite, pickaxes, mercury, and the strength of their arms to dig for fortunes operating illegally and in an unregulated manner (Harkinson, 2003, p. 1). Indeed, these miners earn a living at great threat to their lives. According to Hilson et al. (2017), there are at least 20 million people directly working in the mining sector in sub-Saharan Africa alone, and an additional 100 million people who depend indirectly on mining operations for their livelihoods.

illegal miners at work
source: greengrants.org

Meanwhile, for many an observer, mining is bad for development as it is associated with appalling labour conditions, unequal distribution of wealth, and unsustainable patterns of development and growth (Bebbington et al., 2008). For example, Al-Hassan and Amoako (2014) argued that while the advantages of mining to national economies are apparent, the mining-related local environmental and social costs are largely not sufficiently compensated.

Ghana is the second-largest producer of gold on the African continent,

where mining is described as an ancient industrial activity (Awudi, 2002; Amponsah-Tawiah and Dartey-Baah, 2011). Buried in Ghana's geological landscape are a variety of minerals with the commercially exploited ones being gold, diamond, manganese, and bauxite. Ghana's long history of mineral endowment and prospecting earned the country the name the Gold Coast. Over the last two decades, the mining sector of Ghana has witnessed significant foreign direct investment and hence made substantial contributions to the country's economy (Appiah and Buaben, 2012). Mining and quarrying accounted for 12.6% of GDP in 2019, 18.38% of direct domestic revenue, and 19.05% in corporate tax over the same period.

Again, mining companies paid about GHC1,006,668.50 in royalties to the government and deserving communities in 2019. There are currently about thirteen (13) large-scale mining companies with 16 operations and over 1000 registered small-scale companies in the sector (Ghana Chamber of Mines, 2020). The small scale/artisanal sector alone employs about 1.1 million people most of whom are illiterates and employ very primitive methods in mining at the expense of their lives (Wilson et al., 2015). Therefore, several authors have recognized the mining sector as central to achieving many of the sustainable development goals, especially in developing countries (Hentschel et al., 2002; Amponsah-Tawiah and Dartey-Baah; 2011, Nti, 2020).

Despite the significant contributions of mining to the economy, infrastructure development, and rural livelihoods, it has been recognized to be a major cause of environmental degradation in Ghana as well (Tetteh, 2010; Armah et al., 2013; Arah, 2014). Adverse impacts of mining in Ghana range from loss of agricultural land to mining operations, high costs of living, sporadic cyanide contamination of water bodies, deforestation, unemployment in mine-take communities, leading to general public discontent with the performance of the sector (Ayee et al 2011; Amponsah-Tawiah & Dartey-Baah, 2011). There are also reported increases in diseases such as malaria, respiratory diseases, HIV/AIDS, and increased social challenges such as drug abuse, social segregation, and forced displacement

in many mining communities across the country (Amponsah-Tawiah and Dartey-Baah, 2011; Erdiaw-Kwasie et al., 2014)

With the recent increase in global demand for mineral products and foreign investment in the mining sector of developing countries and the attempt by the global community to ensure sustainability in all developmental activities, many have emphasized the need to adopt sustainable development principles in mining operations (Erdiaw-Kwasie et al., 2014; Kokko et al., 2015; Akpalu and Normanyo, 2017; Ghorbani and Kuan, 2017; Carvalho, 2017). According to these authors, this will ensure a balance between economic, social, and environmental needs for the wellbeing of mine-take communities. However, according to Dubinski (2013), the complexity of challenges in the mining sector demands diverse expertise, multiple stakeholders, modern technology, and research to achieve sustainable development in mining.

While many governments and mining institutions in the global north have made significant progress in incorporating these principles in their mining operations Kogel et al. (2014), it is still uncertain how developing countries especially in Africa are adopting these principles. This study is therefore one attempt by Good Governance Africa to unpack this rather contested and ambiguous territory, particularly as it relates to African mine-take communities, using the Ahafo area, where Newmont Ghana Gold Limited operates a major concession as a case. While the reasons for the choice are elaborated in the methodology, the Ahafo area, and Newmont's operations have received commendable reviews from sustainability watchers to warrant an empirical assessment. The lessons may be relevant for other industry actors and national policymakers if they are proven to be sustainable and enduring.

Newmont moves forward with Ahafo mine expansion
source: northernminer.com

1.2 Gaps in Knowledge

As an activity that impacts all the pillars of sustainable development, many international organizations, governments, and mining regulatory agencies have raised concerns and emphasized the need to ensure compliance with sustainable development principles and standards in mining operations. According to Ghorbani and Kuan (2017), given the substantial social, environmental, and economic impacts of mining operations, the need for sustainable development in the mining sector cannot be overemphasized. Over time, these concerns have translated into advocacy initiatives that have influenced empirical studies seeking to understand the nexus between mining and sustainable development.

Globally, many empirical studies have sought to explore the nexus between mining and sustainable development. However, these studies have largely focused on the global north (Hilson and Murck, 2000; Dubinski, 2013; Kokko et al., 2015; Carvalho, 2017; Ghorbani and Kuan, 2017). For instance, in a review of sustainable development in the Chilean mining industry, Ghorbani and Kuan (2017) expressed concerns about the need to address challenges with energy and water management, civil rights protection, compliance with environmental regulations as well as investment in research and modern technology for sustainable mineral exploitation. Similarly, Kokko et al., (2015) in comparative studies on sustainable development in the mining sector reported that, for sustainable development to be achieved in the mining sector, there is the need for functional environmental regulations and public participation in decision making.

Despite the significant progress made in the mining and sustainable development debate and reported improvement in environmental performance and social lives of indigenous peoples in the global north, limited progress has been made in Africa (Richards, 2009). Though many researchers have made significant contributions to the different dimensions of mining and development challenges in Africa (Asare and Darkoh, 2001; Boocock, 2002; Hilson, 2002; Mahalik and Satapathy, 2016; Mabey et al., 2020), limited empirical studies have focused on the nexus between mining and sustainable development

(Hilson and Murck, 2000; Nti, 2020).
The situation in Ghana is not so different from what persists in other African countries. Empirical studies in the mining sector have largely focused on the environmental (Aryee et al., 2003; Erdiaw-Kwasieet al., 2014; Nasirudeen and Allan, 2014; Mensah et al., 2015; Bagah et al., 2016; Attiogbe and Nkansah, 2017) and socioeconomic impacts (Bansah and Bekui, 2015) with limited focus on interrelated elements of the environment, economy and social development of mine-take communities. Similarly, in Kenyasi where this study was conducted empirical studies on mining have largely focused on environmental (Kwaansa-Ansah et al., 2017) and socioeconomic impacts (Opoku-Ware, 2014; Boakye et al., 2018). While these studies provide important perspectives on the subject, they do not provide a holistic view of the three dimensions of sustainable development in the mine-take communities.

Also, limited use of geospatial technologies such as GIS and remote sensing technology was adopted in these studies. Also, many authors have argued that sustainable development in the global south will require continuous environmental and socioeconomic improvement through an internationally coordinated legal system, exchange of experience, and modern technologies (Hilson and Murck, 2000; Carvalho, 2017; Dubinski, 2013). This will require extensive research to identify the particular challenges of different countries to proffer tailor-made recommendations to ensure long-term socio-economic and environmental sustainability in mining communities. This study, therefore, seeks to unpack the relationship between mining and sustainable development. The study will adopt the use of geospatial technologies, household questionnaires, key informant interviews, and direct field observations to meet the objectives of the study.

1.3 Objectives of the Study

The study aims to unpack synergistically the relationship between mining and sustainable development of communities within the catchment of mining operations and provide policy recommendations on how to maximize the benefits of mining on the development of host communities. The specific objectives to guide the study are:

- Assess forest cover, land cover, land use, and watercourse dynamics to understand the impacts of mining on the environment;
- Obtain data on income stability, food availability, equality of access to employment opportunities, maintenance of expenditure over time, to establish the relationship between mining and economic development; and
- Collect and analyse data on access to land resources equitable access to information and services, the participation of stakeholders, and local accountability in the use of mineral royalties to unpack the relationship between mining and social development;
- Assess the vulnerability and adaptive capacity of host communities to mining operations and provide policy recommendations for action.

1.4 Scope of Work

The assignment is detailed in the Memorandum of Understanding (MoU) attached as Annex B. The study will focus on mine-take communities within the catchment area of the Ahafo South mine of Newmont Goldcorp. The mine-take communities for this study will include Kenyasi I, Kenyasi II, Ntotroso, Gyedu, and Wamahinso. In these study communities, the study will theoretically and empirically assess the nexus between resource extraction and sustainable development. This will serve as the basis to inform policy on alternative pathways to making mining sustainable and beneficial to mine-take communities in Ghana

1.5 Organization of the Report

This report is organized into eight chapters. The first chapter presents the background and rationale, gaps in knowledge, and objectives of the study. Chapter two reviews the relevant literature and debates

on the nexus between mining and sustainable development to situate the study within the wider global, regional and national context. Chapter three outlines the methodological approaches used to solicit information from the various study communities to meet the objectives of the study. Chapters four, five, six, and seven are used to analyse and interpret the results emanating from field data collection based on the objectives of the study. Chapter eight provides a summary of findings and the main conclusions from the study. Policy recommendations for enhancing the sustainability of resource extraction particularly in the study area and mining communities in Ghana in general have also been made.

Newmont Goldcorp Ghana - Ahafo mine partners with stakeholders to construct 4km town roads for 5 south host mine communities

source: modernghana.com

Chapter 2
PERSPECTIVES ON MINING AND THE RESOURCE CURSE

2.1 Introduction

The context, rationale, and scope of the research have been discussed in the introductory chapter. This chapter explores relevant literature on the subject. To start with, mining, defined as the extraction of minerals from the earth is associated with several opportunities, potentials, constraints, challenges, and risks to sustainable development. Minerals are essential for human well-being and fundamental for all sectors of the economy (UNEP, 2000). As a result, mining is undertaken in every continent and almost every country with significant socio-economic and environmental footprints. The UNDP (2018) observes that due to the importance of mining to various nation-states, it has significant impacts on 11 out of the 17 Sustainable Development Goals. This section presents a review and discussion of the literature as they relate to mining on the one hand and sustainable development on the other hand. The section begins with a discussion on the nexus between mining and development and further delves into the resource curse theory and its variants. Although a case, study, an attempt is made to understand the issue from a global through to African and Ghanaian perspectives.

2.2 Nexus between Mining and Development

The pursuit of development is probably humanity's most enduring preoccupation. As such development has been variously conceptualised by academics and policymakers. Originally construed as an economic concept, development was generally constructed and measured using economic variables such as GDP, income per capita, employment, and unit output (Eversole & Martin, 2005). It eventually evolved to embrace such notions as basic human needs comprising shelter, food, clothing, and good health. In more recent times, it has been further widened to encompass multi-dimensional variables, defined in terms of capabilities, and measured in terms of the attainment of "valuable functionings"

(Sen, 1992, p. 39). In the last two or so decades, development is construed as seeking to attain an optimum balance between social, economic, and environmental variables (Brundtland & World Commission on Environment and Development, 1987). Development has assumed such an all-encompassing meaning and its qualifiers multiplied (Escobar, 1997) to an extent that it is probably much better seen in the claim by Wildavsky (1973), that "if planning (development) is everything, maybe it's nothing" (my emphasis). According to de-Sardan (2005, p. 38), development is seen as "actions for change" in a given system. These actions, he observed could be initiated by governments, activists, or private operators to transform the behaviour of actors.

The actualisation of development, however, has been fraught with several "backs-and-forth" leaving us with no universally accepted way to the realisation of development outcomes. de-Sardan (2005, p. 70), contends that development professionals situate development practice within two intricately woven paradigms: "Development seeks the welfare of others (the altruist paradigm), hence its strong moral connotation; development implies technical and economic progress (the modernist paradigm), hence its strong evolutionists and technicist connotation". Invariably, de-Sadan's position resonates well with the approaches that have been employed by governments, multi-lateral and bi-lateral development agencies, and the many varied actors in the international development space. Conclusively, however, de-Sardan (2005, p. 38), the notion of development as "actions for change" in a given system has wide applicability. This is even the case when examined from the understanding that it can be initiated by governments, activists, or private operators alone or in collaboration with each other. This point is very important because the nexus between mining and sustainable development, the thrust of this research, requires significant actions by interested publics, including private mining firms with the active support of local actors for change.

Mining, on the other hand, is generally perceived as destructive, and an usurpation of communal resources for corporate and individual benefits. Indeed, Bebbington, Hinojosa, Bebbington, Burneo, and Warnaars (2008) have described mining as an ambiguous and contentious issue. They argue that mining is contentious because it leads to adverse environmental, social, and economic impacts for the many and significant

gains for a handful of people. It is also ambiguous because of the latent optimism among the general populace and development professionals that perhaps mining could contribute more. They conclude that: "in the coexistence of such divergent feelings about mining and its human and environmental impacts lie the seeds of many conflicts" (Bebbington et al., 2008, p. 965).

Conclusively, development and more so its "sustainable" variant is so piously construed and mining so deleteriously understood that it is almost impossible to reconcile the two. This empirical study will seek to unpack the connections if any between these two important, yet conflicting human endeavours. In a rather nuanced way, the study will attempt to understand whether mining can be undertaken with the community to attain goals that are mutually beneficial and sustainable. This is intended to help us have an empirical basis to challenge the notion that mining is purely destructive, and to bring to the fore an (un) successful case of the extent to which mining and sustainable development can co-exist or otherwise.

Kenyasi No.1 Community Centre
source: facebook.com (NADeF)

A principal's bungalow for the soon-to-be-launched Ntotroso Community Health Nurses' Training College.

source: facebook.com (NADeF)

2.3 The Resource Curse Theory and its Variants

The resource curse or the paradox of plenty has defined the discourse around resource extraction for well over six decades. Fundamentally, the theory espouses the argument that the possession of valuable deposits does not necessarily translate into economic success (Ziyadov and Shaffer, 2011). Credited to the work of Auty (1993; 2001), it is argued that while countries such as Angola, Nigeria, Sudan, and the Congo are rich in oil, diamonds, and other minerals, their people continue to experience low quality of life. On the other hand, the East Asian economies of Japan, Korea, Taiwan, Singapore, and Hong Kong have managed to achieve substantial growth and standards of living comparable with Western countries despite being rocky islands with virtually no exportable natural resources (Ziyadov and Shaffer, 2011). The conclusion is therefore that there is a positive correlation between resource abundance and its extraction and poor economic performance and other socio-economic ills (stevens et al 2015). Indeed, Prebisch and Singer (1950), had a course to question the benefits from primary product exports and concluded that commodity exporters are more likely to suffer secular deterioration of the barter terms of trade. Seven lines of arguments have been put forward to explain the reasons behind the "paradox of plenty" discourse.

1. First, prices of mineral resources are most often subject to secular decline on world markets;
2. Second, there exists high volatility of prices for energy, other mineral and agricultural commodities at the world stage;
3. Third, natural resources have the potential to become dead-end sectors, crowding out manufacturing or other sectors which could offer dynamic benefits and spillovers that are good for growth;
4. Fourth, good governance structures such as rule of law and decentralisation which offer opportunities for participatory decision making are likely to be weakened in countries where physical command of mineral deposits is in the hands of the government or by a hereditary elite;
5. Fifth, the inability in most instances to impose private property rights on mineral resources can result in their rapid depletion, not accompanied by any significant socio-economic progress;
6. Sixth, countries rich in mineral resources have a proclivity for armed conflict, a phenomenon seen to be inimical to socio-economic

development; and
7. Seventh, volatility in commodity prices could lead to excessive macroeconomic instability (Ziyadov & Shaffer, 2011).

2.3.1 The "Dutch Disease"

A major variant of the resource curse thesis is the "Dutch Disease" discourse. The Dutch Disease school observe that a boom in the resource sector resulting either from new exports or from a rise in the price of existing exports causes a shift in production factors away from agriculture and industry towards the extractive sector with the potential for currency appreciation (Engels & Dietz, 2017; Saad-Filho and Weeks 2013). It is generally argued that the "Dutch Disease" results in "large real appreciation in the local currency; an increase in spending; an increase in the price of non-traded goods; resultant shift of labour and land out of non-export- commodity traded goods; and a possible current account deficit" (Ziyadov & Shaffer, 2011; p. 39)

The term "Dutch Disease" was first coined by The Economist, to explain the experience the Netherlands went through in the 1960s. When gas was discovered in the North Sea, the Netherlands experienced a resource boom that led to a substantial appreciation of its currency and resulted in an erosion of the competitiveness of other exports (Saad-Filho and Weeks 2013). Since then, the term has been used in reference to several other countries that discovered natural resources and failed to ensure that the resource benefits the larger society. The "Dutch Disease" received widespread theoretical and policy attention because it is said to impact negatively on traditional industries, resulting in bankruptcies, job losses, and the elimination of skills (Saad-Filho and Weeks 2013).

Conclusively, the argument has also been made that natural resource extraction has a negative impact on institutions (Mehlum et al. 2006; Gilberthorpe and Papyrakis 2015, p. 384). The crux of this argument is that natural resource extraction tends to encourage rent-seeking behaviour, corruption, nepotism, and clientelism. This results in the weakening of economic and political institutions thereby distorting markets and discouraging investment in sectors beyond the extractive industries (Engels and Dietz, 2017).

2.3.2 The Rentier States

Rentier states theory argues that natural resource-based development models often result in the creation of a specific political regime: the rentier state. These are defined as such because of their financial dependence on international rent income; mostly 40 percent of government income (Mahdavy 1970; Beblawi and Luciani 1987). Rent in this context is defined as income generated by mere ownership and derives neither from investments nor from labour (Sørensen 1996, pp. 1336–8). The main concern with natural resource-dependent countries in the Global South is not the rent income per se, but its international character. Natural resource rents of this nature represent an international transfer of income from consumer states (mostly located in the Global North) towards extractivist states (located mostly in the Global South). These rent transfers create a cycle of continuous extraction to augment import capacity, without increasing production (Baptista 2010).

The rentier state paradigm links natural resource extraction to authoritarian regimes (Ross 2001). In this vein, democratisation is not pursued due to the state's capacity to appropriate an important part of the rent income. It is argued that the state then uses the rent captured to create political legitimacy by the distribution of the rent income through channels such as subsidies for basic goods, housing, and energy; the creation of government jobs and business opportunities for local investors and merchants; government spending in social policy programmes and infrastructure projects; low taxation; and overvaluation of the currency (Engels & Dietz, 2017, p. 49). Such a system it is argued (Ross, 2001) creates different mechanisms of unequal rent distribution resulting in a complex system of benefits, privileges, and exclusions, which allow for the binding of certain groups to the regime, thereby strengthening its power base.

2.4 African Perspectives

Although not much has been done about how the resource curse theses have played out in resource-rich African countries, the little that has been done also point to tendencies of the curse in some countries while others seem to have circumvented it. Gelb (1988) carried out a study on the resource curse phenomenon in several developing countries across Latin America and Africa (Nigeria and Algeria included) and concluded

The deplorable state of Hwediem – Kenyasi road in the Asutifi District.

source: xplonlinegh.com

that there existed a negative connection between natural resources and economic growth. He established that windfalls from the booms of 1974 – 1978 and 1979 – 1981 had adverse effects on the economic growth of those countries due to price volatilities, which affected growth and planning.

Recent case studies of different countries across Africa support the resource curse thesis. Dupuy (2017) compared revenue distribution policies for Ghana and Sierra Leone and concluded that local elite capture coupled with limited transparency and accountability, has resulted in fund misuse and embezzlement in both countries. He further argues that although the intent behind the establishment of such funds is good, they ultimately fail to uplift mining communities through improved incomes, infrastructure, and social services due to power dynamics. Similarly, Amundsen (2017) discusses Nigeria as the quintessential resource cursed country which although rich in oil wealth, experiences high levels of oil sector corruption, embezzlement, and capital flight.

Meanwhile Botswana, an African Country is also projected alongside advanced countries like Norway as an outlier in terms of how it has been able to use mineral resources to propel equitable socio-economic development (Collier, 2008). Botswana can circumvent the resource curse by investing in productive sectors of the economy and promoting diversification through local processing of the natural resources, thereby

creating linkages to other sectors of the economy and creating employment opportunities (Khama, 2016).

In light of this emerging evidence, the resource curse theory has been variously criticised in terms of its framing, actors, and structures. Wright and Czelusta (2002) for instance argue that some of the cross-country regressions used in the various studies that concluded that there existed a positive correlation between resource abundance and poor economic development are subjective and contained significant selection biases. The institutional perspective suggests that resource wealth alone cannot be a determinant of whether a country will suffer a curse. They rather posit that the likelihood of experiencing a curse is dependent on the quality of state institutions (Boschini et al., 2007).

2.5 The Ghanaian Perspective

Ghana is a resource-rich country. Whether it suffers from a curse or not is unclear. While studies by Siakwah (2016, 2017) show that resource curse, even if exists in Ghana cannot be blamed solely on our resource position, others such as Dupuy (2017) and Boamah and Williams (2017) indicate that the phenomenon has taken roots in Ghana. This particular study is interested in the nexus between resource extraction and sustainable development of mine-take communities. It would therefore help in our understanding of the phenomenon. This section, therefore, examines some of the things that Ghana is putting in place to reform the mining sector to make it more productive, contribute to economic growth and development and overcome or avoid the resource curse.

2.5.1 The resource sector in Ghana

Ghana is rich in all kinds of mineral resources including manganese, diamonds, and bauxite, oil, and gold. However, gold is the most important mineral resource of the country. The largest gold deposits are found in the Ashanti, Western, Central, and Brong-Ahafo Regions. Generally, the mining and quarrying sector contributed GH¢ 4.02 billion in 2019, an increase from 4.9 percent in 2018 to 7.6 percent in 2019 to national revenue. Again, all export revenue from the mining sector amounted to US$ 4.5 billion in 2019, US$ 3.3 billion of which was returned to the country, representing 73 percent of export proceed.

In terms of employment, the sector provided direct employment to a total of 11,899 workers; an almost 2000 increase on the 2018 figure of 10,109. Mining companies in Ghana are also committed to their corporate social responsibility. As a result, the companies through the Ghana Chamber of Mines have set up the Tertiary Education Fund into which an amount of US$442,500 is paid annually over a five-year period to be used to support the education of high caliber human resources for the minerals and other sectors of the economy. Overall corporate social investments made by mining companies amounted to US$24.45 million for the year 2019 (Ghana Chamber of Mines, 2019). Figure 2.1 shows the share of mineral receipts in total exports from 2005 to 2019.

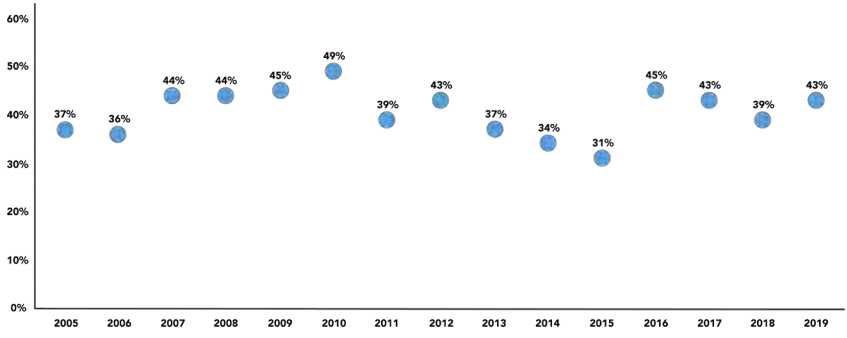

Figure 2.1: *Share of Mineral Receipts in Total Exports (2005 – 2019) Source: Ghana Chamber of Mines' (2019)*

2.5.2 Mining reforms

Ghana pursues its mining sector programmes and policies within broader international trends and recommendations. Efforts to attract Foreign Direct Investment (FDI) have meant that policies are often watered down to the level deemed beneficial to the investor community. This has been the situation with the mining sector since the 1980s and the result has been low government revenues from mining in comparison with the sector's size and output (Ayee et al., 2011).

Recently, however, some reforms are taking place. These range from local content policies, to policies requiring of mining companies to establish community consultative committees, community relations units, environmental sustainability agreements which are contributing to re-shape the mining sector and enhance its contribution to the development of the country and host communities (Aubynn, 2013). Again, mining companies in Ghana are operating within global and regional initiatives such as Publish What you Pay (PWYP), Extractive Industries Transparency Initiative (EITI), the Kimberley Process Certification Scheme (KPCS), the US Congress' Frank-Dodd Act, and the African Mining Vision (AMV) which have evolved over the years to help curtail practices undergirding the global resource curse (Khadiagala, 2015).

There have also been reforms to mining laws with the most significant being the Minerals and Mining Amendment Act, 2019 (Act 995) which introduced amendments to the Minerals and Mining Act, 2006 (Act 703). The new Act prohibits foreigners from providing mining support services to small-scale miners and imposes stiffer punishment for the sale or purchase of minerals without a license. Further amendments to Act 703 will reduce the duration of a development agreement from 15 to 5 years; and introduce gender considerations into employment in the mining sector (Tsikata and Quashigah, 2020).

2.5.3 Benefits from mining

There are varying opinions about the contributions of mining to the development of Ghana in general and mining communities in particular. While others think that mining has contributed positively, some usually focus on the negatives of the industry. Mining operations are regarded as environmentally and socially disruptive business (Peck & Sinding, 2003). The extractive industry is blamed for many of the environmental

disasters and the human rights issues that have led to public outcry about the actions of companies over the last 40 years (Warhurst, 2001). Irrespective of the negative view, there have been modest gains in the Ghanaian context, some of which have already been discussed under section 2.5.1.

Aside from the usual revenues, employment, and investment issues, the Ghana Chamber of Mines (2020) also shows that mining companies have contributed to better communication technology, banking, electricity, health, education, human resource development, and technology transfers in general. Mining companies are of the view that in-country spending of their earnings contributes to the socio-economic development of the country and host communities. As such mining companies in Ghana spent US$ 1.88 billion on the purchase of non-energy goods and services from manufacturers and suppliers within Ghana. Again, about 8 percent of mineral receipts were spent on electricity and diesel over the same period (Ghana Chamber of Mines, 2020). The companies also spent US$24.45 million on Corporate Social Responsibility (CSI) projects as detailed in Figure 2.2.

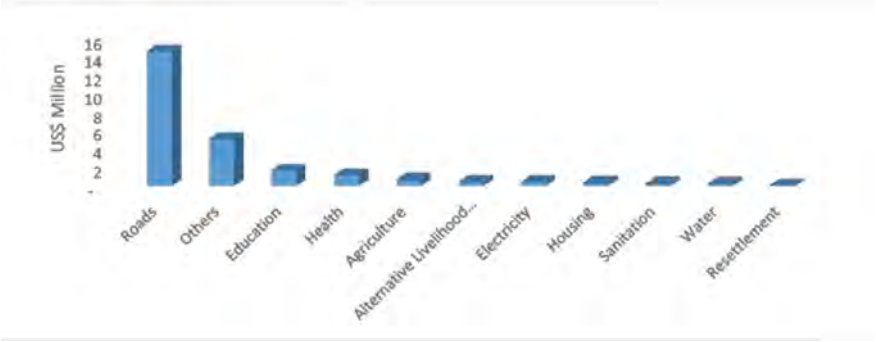

Figure 2.2: *Sectoral Distribution of CSI for 2019*
Source: Ghana Chamber of Mines (2020)

Within the Ahafo area, where this study was undertaken, Newmont Goldcorp worked with community groups to establish the Newmont Ahafo Development Foundation (NADeF). The NADeF was incorporated as a trust limited by guarantee and a nine-member Board of Trustees was sworn into office on 29th May 2008. Currently, Newmont contributes $1 per ounce of gold sold and 1% of net pre-tax annual profit from its mining operations in Ahafo for the sustainable development of the mine area. Three agreements also emerged from the NADeF processes as follows:

- **Relationship Agreement:** strengthens further the cordial relationship between NGGL and the Community.;
- **Employment Agreement:** spells out modalities governing the employment of locals by NGGL; and
- **Foundation Agreement:** focuses on the funding and implementation of sustainable development projects within the communities (Newmont Ahafo Development Foundation, 2009).

2.5.4 Regulatory regime

Ghana has a robust regulatory system of laws and institutions that govern how mining operations are conducted. The Minerals and Mining Act, 2006 (Act 703) as amended by the Minerals and Mining Amendment Act, 2019 (Act 995) is the main legal framework governing mining operations in Ghana. Act 995 makes the state the owner of all mineral resources in its natural state within Ghana's land and sea territory, including its exclusive economic zone. Institutionally, various governmental, non-governmental, and community groups are involved in the overall governance of the mining sector of the country. Table 2.1 shows some of the major actors in the mining sector of Ghana.

Table 2.1: *Mining Sector Players in Ghana*

State-level	President, Parliament, Judiciary, Ministry of Finance, Ministry of Lands and Natural Resources, Environmental Protection Agency, Bank of Ghana, Ghana Revenue Authority, Office of the Administrator of Stool Lands, Ghana Extractive Industries Transparency Initiative
Local	Metropolitan, Municipal and District Assemblies with mining operations
Non-state	National Coalition on Mining, WACAM, TWNG ISODEC, Chamber of Mines
Mining Companies	Mining companies such as Newmont, Ashanti Goldfields, Anglogold Ashanti, Bogoso, Chirano, Golden Star, Perseus mining Ghana Limited
International Players	Bilateral and multilateral institutions the Canadian International Development Agency, Department for International Development, World Bank, African Development Bank (AfDB)
Collective Players	Citizens Constituencies; Communities
Traditional authorities	Traditional councils, chiefs

Source: *Modified from Aryee et al., (2011, p. 12)*

2.5.5 Representation of mining communities

While there appear to be significant contributions by mining companies towards the development of host communities, a lot of hostilities also remain. Mining communities do not see government as working to improve their interest and welfare. There appears to be a power imbalance between poor farming communities and multinational mining companies that have a bottomless resource base. Meanwhile, democratic representation for affected members of the operations of mining activities is essential for the harmonious co-existence of mining companies with their host communities (Ayee et al., 2011).

It is argued that policymaking regarding mining operations is centralised to the neglect of local communities. The Minerals Commission for instance is only accountable to Parliament through supervising ministries (Ayee et al., 2011). Meanwhile, Parliament has also been criticised for providing no support for communities affected by mining (Akabzaa et al., 2007). It appears that with agreements such as NADeF, the narrative may change as communities are forming sustainable development committees to engage with mining companies to find solutions to their problems.

2.6 Conclusions

Globally, mining is under the spotlight for various reasons. It is seen as either creating a resource curse, a rentier state, or a Dutch disease. However, evidence of robust contributions to national development have been discussed in the literature. In the Ghanaian context, similar arguments as to the importance of mining to the national economy and the development of host communities have also been raised. Overall, it is important to conduct case studies of specific mining operations to have a nuanced understanding of the issues rather than relying on large data sets culled from various national documents and related studies. This is an attempt to understand the issues using a case study. The next chapter will discuss the methods used for the study.

The Minister of Lands and Natural Resources, Mr Samuel Abu Jinapor in a meeting with the National House of Chiefs in Kumasi on how Traditional Authorities are to be involved in the issuing of mining license

source: gbcghanaonline.com

Chapter 3
CONTEXT AND METHODS

3.1 Introduction

The study was conducted in the Ahafo area located in the former Brong Ahafo Region. The study seeks to understand the nexus between mining and the development of host communities through the lens of the defining elements of Sustainable Development viz social, economic, and environmental variables. While all the indicators used to assess sustainable development are not captured, several relevant indicators have been identified to help us understand the subject at hand. This section of the study discusses the context within which the study was undertaken and the methods employed to collect data for the purpose.

3.2 The Study Area

The study was carried out in the Ahafo area, where Newmont Goldcorp operates a major concession. The concession is located within the Asutifi North District within the newly created Ahafo region. The District lies between latitudes 6°40′ and 7°15′ North and Longitudes 2°15′ and 2°45′ West. The District capital is Kenyasi, located about 50km from Sunyani. In terms of land area, the District covers about 1500 sq. km. It shares boundaries with Asutifi South District to the south-east, Sunyani Municipal to the north, Tano North District to the north-east, Dormaa Municipal and Dormaa East to the west and north-west respectively. It also shares a boundary with Asunafo North to the south-west. The District serves as the host to one of the biggest mining operations in Ghana. Consequently, it offers an ideal environment to unpack the phenomenon of mineral extraction and sustainable development of mine-take communities.

The population of the District according to the 2010 population and housing census stands at 52,259 with 26,761 males 25,498 females. It is home to the world's largest, multinational gold mining firms in Ghana. Newmont's operations in the Ahafo area are divided into two, namely:

the Ahafo North and the Ahafo South Projects. While the Ahafo South has been in operation since 2006, commercial production of Gold at the Ahafo North is yet to fully commence. Kenyasi No. I, Kenyasi No. II, Ntotroso, Gyedu, and Wamahinso constitute the main mine-take communities under the Ahafo South project while Yamfo, Adrobaa, Afrisipakrom, Susuanso, and Terchire are the communities within the Ahafo North project area.

Newmont Goldcorp has over the years contributed to Ghana's Gross Domestic Product (GDP). Newmont Goldcorp has supported the government with US$ 360 million (0.95% of GDP) in terms of economic activity. It has also directly contributed more than US$ 160 million in terms of Ghana's tax income (2.56% of national tax revenues of Ghana), US$ 39 million to household income, and US$ 31 million as carried interest income to the government (paid when dividends are declared). The company also has supported about 41,000 jobs (0.39% of the total labour force in Ghana), of which 1,921 jobs are directly created. In a nutshell, Newmont Goldcorp has contributed immensely to the successes of Ghana's economy in its spending pathways as well as its multiplier effects for individuals and households.

Newmont Goldcorp has become an important partner in the socio-economic development of not just Ghana but even so a more important player in the socio-economic development of the Ahafo area. Through its Newmont Ahafo Development Foundation (NADeF), the company has embarked on several initiatives that seek to improve the resilience of the mine-take communities and to enable them to adapt and transition from communities dependent on the multiplier effects of the gold mining to ones that are locally and nationally competitive. These socio-economic successes are often directly attributable to the presence of Newmont. Over the last six years, Newmont is adjudged the most environmentally sustainable mining operation in Ghana. In light of these reviews, the Ahafo area provides an interesting context to undertake an empirical exploration of the thorny issue of the nexus between mining and sustainable development of host communities. The recommendations from the study can provide insights on how to strengthen mining and community development or otherwise and serve as important goalposts for other mining companies.

3.3 Selection of Study Communities/Towns

The study adopted a census approach in selecting the study communities. The study area (Ahafo South concession) has five (5) mine-take communities with all the five mine-take communities being selected for the study. These communities include Kenyasi No. I, Kenyasi No. II, Ntotroso, Gyedu, and Wamahinso. Newmont Goldcorp treats these communities as the main mine-take communities within the catchment of its operations. The main production site of the mine is also located between Ntotroso and Kenyasi I and II. Even though these communities are major mine-take communities, their primary economic activity is agriculture and agro-processing activities aside from some artisanal mining, manufacturing, making traditional crafts, and service provision (catering, hairdressing, tailoring, etc.).

3.4 Sampling Approach and Sample Size determination

A proportional sampling technique was used to determine the sample size for the different mine-take communities for purposes of administering questionnaire. The 2010 Population and Housing Census report indicate that the total number of households for the five mine-take communities is 6,305. Using fluid surveys: http://fluidsurveys.com/university/calculating-right-survey-sample-size/ the sample size for the study was determined. Given the total number of households per community, proportional sample size was determined for each community. Table 3.1 shows the sample size for each of the study communities.

With a confidence interval of 95 percent and a 5 percent error margin, a sample size of 363 was determined for the communities. Subsequently, the sample size for the mine-take communities was proportionally determined and allocated based on the GSS data. This number comprised Kenyasi No. II – 163; Kenyasi No. I – 82; Ntotroso – 70; Gyedu – 29; and Wamahinso – 19 The calculated sample size was statistically representative of the study population and can fairly serve as the basis for generalisations across similar populations. Questionnaires were administered in these study communities using systematic sampling techniques. In this sense, the first unit for each community was selected randomly which then served as the basis for the selection of subsequent respondents.

A photograph of some residents of Asutifi North .
source:ircwash.org

Table 3.1: *Sample size*

Community	Number of Household heads	Sample size
Kenyasi No. II	2,838	163
Kenyasi No. I	1,427	82
Ntotroso	1,209	70
Gyedu	500	29
Wamahinso	331	19
Total	6,305	363

Source: *Modified from Aryee et al., (2011, p. 12)*

3.5 Types and Sources of Data

Primary and secondary information were the main sources of data the study relied on. Using a questionnaire and a structured interview guide, primary data was obtained from household heads and officials of government institutions. The structured interview guides were targeted at state institutions involved in managing agrarian activities and managing state resources in the District (District Assembly and District Directorate of Agriculture). This offered the researcher the opportunity to probe how agrarian activities are being impacted by the mining activities in the mine-take communities. Also, it allowed for an understanding of the inflow of royalties to the District Assembly and the uses to which such resources have been put.

Policy documents from Government Institutions, the 2010 Population, and Housing Census Report, Reports from the District Assembly, alongside published academic articles served as sources of secondary data and aided the researchers to situate the study in the context of current academic debates.

3.6 Process of Data Collection and Quality Control

The researchers adhered to the data collection processes agreed upon with the client from the onset. However, possible changes made to the processes were discussed with the client where necessary. As the COVID-19 pandemic continues to cause havoc, some of the processes involved in the data collection exercise were altered. Irrespective of these changes, best practices were adopted in the data collection exercise to ensure that the quality of the data collected was not compromised. In ensuring that the data quality was not compromised the lead researcher ensured the following:

- Training of field assistants to understand the data collection processes and procedures, the instruments used for the data collection, and what they seek to solicit from the respondents.
- Field assistants were also trained in the local language and how to interpret the various questions in the local dialect to get the right information from the respondents and also solicit the right responses.
- The cost of the research itinerary (i.e., transportation to and from) and other necessary logistics were provided to enhance timely data collection exercise.

- As a result of the COVID-19 pandemic, the field assistants were also encouraged to adhere to the COVID-19 protocols to ensure they and their respondents are safe.

Field enumerators were supervised by experienced researchers who had a minimum qualification of a Master's Degree in the relevant field. With their expertise, they provided leadership and ensured the field enumerators followed the data collection control measures put in place. As and when they faced any difficult situation, the supervisors provided the necessary assistance to ensure data quality. The quality control mechanisms put in place include:

- Following all the data collection procedures and ensuring that they complete their allocated samples within the stipulated time.
- Adherence to the quality measures developed by the partners through the entire duration of the fieldwork exercise.
- Ensure the careful handling of all logistics in their possession.
- Review data collection instruments for completeness at the close of the data collection exercise on daily basis.
- Conduct call-backs on respondents.
- Provide technical backstopping to field assistants on the implementation of the sampling plan.

3.7 Data Collection Methods

Officials from the Asutifi North District Assembly, the District Directorate of Agriculture, and residents within the mine-take communities were the main actors interviewed/administered with the questionnaire for this study. Secondary data on resource extraction and sustainable development were also collected and examined as a way of confirming on-the-ground practices. Further methods are detailed in the sub-sections below

3.7.1 Administration of Household Questionnaire

Household heads within the mine-take communities were contacted and responses were elicited from them on the study. This was done to gain more insight into economic sustainability, social sustainability, and the assessment of the vulnerability, and adaptive capacity of inhabitants of the mine-take communities. To proffer both quantitative and qualitative meanings to the study from the household heads, the

research instrument had both open and close-ended questions. This enabled the respondents to give and express their opinions concerning some questions thereby allowing the researchers to establish and validate some of the responses to the questions.

3.7.2 Key Informant Interviews

The views of officials from the District Assembly and the District Directorate of Agriculture were also captured for this study. Two officials whose work has a direct bearing on the resource extraction and sustainability in the District, that is, the District Planning Officer and the District Director of Agriculture, were interviewed. This aided the researchers to elicit information on mineral royalties and their application and trends in agricultural outputs and the effects of mining on agricultural productivity. Approval from Newmont was required to interview their monitoring and evaluation staff as well as the staff of NADeF. An email to that effect was sent to the Senior Manager for Sustainability and External relations seeking approval to conduct the interviews. No response was received even though a reminder was sent. Therefore, any claims attributed to Newmont in this study are either from verifiable sources online or reports culled from their website.

3.7.3 Direct field observation

Direct field observation was also relied on during the survey in the communities to validate some of the responses from the research participants. The lead researchers undertook a tour of the mine-take communities to observe some of the physical evidence of resource extraction within the mine-take communities and validate the existence of projects funded through mineral royalties. This enabled the researchers to conduct a detailed assessment of the extent of resource extraction and sustainable development practices within the mine-take communities.

3.7.4 LULC images acquisition and sources

Spatial images for the LULC analysis were obtained from the U.S Geological Survey (USGS) Earth Explorer database. Four (4) images were downloaded including acquired Landsat 5, 7, and 8 images for 1990, 2000, 2010, and 2020. The basis for the selection of the images above was to allow for a pre-and post-mining comparison of LULC trends in the study area. The consistency of interval between the images also allowed for a decadal comparison of LULC changes in the study area.

The table below presents a description of images used in the study (Table 3.2).

Table 3.2: *Landsat Images Used in the LULC Change Analysis*

Acquisition date	Landsat	Satellite Sensor	Spatial Resolution	Source
31/12/1990	Landsat 5	TM	30m	
02/02/2000	Landsat 7	ETM+	30m	USGS website
06/02/2010	Landsat 7	ETM+	30m	
16/01/2020	Landsat 8	OLI	30m	

OLI (Operational Land Imagery), ETM (Enhanced Thematic Mapper), and TM (Thematic Mapper)

Source: *Author's construct (2021)*

3.8 Stakeholder Validation Workshop

Having completed the study and submitted the final report to GGA, a validation workshop was held in Kenyasi on April 24, 2021. The workshop brought together a cross-section of critical actors in the Asutifi North District to deliberate on the findings, conclusions and recommendations of the study. The stakeholders who were part of the validation exercise included the Asutifi North District Assembly (District Chief Executive, District Coordinating Director, District Planning Officer, District Finance Officer and District Works Engineer), District Director of Agriculture, a representative of each of the traditional councils, two representatives of each of the community sustainable development committees, and

representatives of civil society groups. While the Newmont Goldcorp group and NADeF were invited for the workshop they did not send representatives. The purpose of the workshop was to afford participants the opportunity to confirm, refute or otherwise help modify the claims, findings and recommendations of the study.

3.9 Data Analysis

The researchers adhered to the scientific data analysis procedures agreed upon with the client from the onset. The quantitative data were analysed using the SPSS version 21 while the qualitative data was done manually by using themes extracted from the interviews. The interviews with the respondents which were recorded electronically were transcribed and presented under the thematic areas based on the major research objectives outlined in the study. For the quantitative data, descriptive and inferential statistics were done to assist the client in getting more insight into the nexus between resource extraction and sustainable development within the mine-take communities within the Ahafo South mining concession in the Asutifi North District.

Spatial images used in this study were processed using ArcGIS 10.2 and ENVI 5.3 and TerrSet IDRISI software version 18.1. The images were preprocessed, geo-referenced, and projected to World Geodetic System (WGS84) and Universal Transverse Mercator (UTM) zone 30 north. The maximum likelihood algorithm supervised classification techniques were used in image classification. Images were classified into five classes (5) namely closed forest, open forest, settlements/bare lands, cropland, and water bodies in the pre-mining analysis and six (6) in the post-mining analysis due to the addition of the miming site class. The table below describes the LC classes used in the study (Table 3.3). Post-classification transition analysis was conducted using the crosstab module TerrSet IDRISI software. The inter-decadal percentage of change, the annual rate of change, and transition rate for the various images were estimated using MS Excel.

Table 3.3: *Description of LULC Classes*

LULC Classes	Descriptions of LULC Classes
Closed Forest	These are areas covered with a dense vegetative cover. These areas are covered with trees whose branches and leaves form a closed canopy allowing little or no light penetration.
Open Forest	These are areas covered with shrubs, herbaceous perennials, plantations, degraded forests, grasses and fallow lands.
Settlements/Bare Land	These are areas with residential and commercial structures. They are dominated by settlements, tarred roads, and concretized surfaces. They also include areas not covered by vegetation i.e., burnt areas, untarred roads, etc.
Croplands	These are areas under cultivation. They are usually covered by cash crops, perennial crops, cereals, etc.
Mining Site	These are areas covered by the mining infrastructure, miming pits, waste rock dumps, etc.
Waterbodies	These are areas covered by rivers, streams, wetlands, and ponds as well as the environmental control and tailing dams within the mining concession.

Source: *Modified from Adusu (2019, p. 64)*

Group photograph of some workers of the Newmont Goldcorp.
source: thebftonline.com

3.10 Research Ethics

The relationship between the researcher and the respondents as well as the principles underlying the research were considered. Ethical considerations are necessary for social research and equally of the essence in this study. Anonymity and confidentiality were the main considerations. Anonymity was to ensure that the identity of the respondents remains unknown. Confidentiality which is not giving access to the information by a third party was also adhered to. Also, informed consent was sought from the respondents before engaging them in the study. De-identification as ethics in research was also adhered to, ensuring that it was always possible to trace information back to the study participants if the need arises.

3.11 Limitations of the Study

A major limitation of this study was the inaccessibility of key informants, particularly Newmont Goldcorp and NADeF due to their inability or

unwillingness to approve their staff to be interviewed for the study. Also COVID-19 update no. 23 which entreated institutions/organizations to operate shift system at the offices posed a major challenge to the field officers as some key informants were not available at the time of the commencement of the study. Where some of them were available, the protocols instituted gave room for limited contact with people and this made it difficult to schedule a meeting with the key informants. As a result, phone interviews were conducted to limit the physical contact with the key informants.

COVID-19 also posed problems for the quantitative data collection exercise. However, the field officers adhered strictly to the COVID-19 protocols outlined by the Ministry of Health to ensure they and their research participants were safe and the data collection exercise carried out successfully. Getting access to the respondents was not a challenge in this regard as most of the household heads were at home due to the "stay at home" advice given as part of the protocols. The field officers were trained on the COVID-19 protocols, logistics (hand sanitizers, nose masks, and gloves) were given to the field officers to ensure their safety.

3.12 Reporting

The reports were submitted to the Client in three main forms:

- An inception report;
- Draft; and
- Final report

With the help of the research team, the lead researcher ensured that the overall report for this study was finalised. To keep the client updated on the progress of work, the principal researcher organised regular debriefing sessions to communicate the challenges, how they were resolved at each stage, and planned activities.

3.13 Dissemination of Findings

The client holds the discretion on how the report for this study will be disseminated. All components of the study will be documented in a report and submitted to stakeholders in any form that the Client deems fit.

Chapter 4
SOCIO-DEMOGRAPHIC ANALYSIS OF STUDY PARTICIPANTS

4.1 Introduction

This section presents descriptive statistics from the study, detailing the demographic characteristics of the study participants. Their community and household dynamics,gender, age, marital status, religion, educational and occupational dynamics are the focus of this section. The essence of this analysis is to understand the dynamics of the individual study participants and their ability or otherwise to appreciate and contribute meaningfully to the issues under investigation.

4.2 Community and Household Dynamics

The study participants were sampled from the five main mine-take communities under the Ahafo South project area of Newmont Goldcorp. Out of the total of 365 heads of households sampled for the study 163 representing 44.9 percent of the respondents were from Kenyasi No. 2, whereas 82 (22.6%) were from Kenyasi No. 1 (Table 4.1). Respondents from Ntotroso, Gyedu, and Wamahinso were 70 (19.3%), 29 (8.0%), and 19 (5.2%) of the study population, respectively. The study samples are representative and proportional to the total number of households for each community based on data culled from the 2010 Population and Housing Census Report.

The average household size for the communities was five (5). Specifically, 57 (15.7%) of the study participants had average household sizes of less than two (2), whereas 221 (60.9%) of the sampled participants had household sizes of more than five (5) members. This finding also confirms the 2010 Population and Housing data for the District that puts the average household size to be 4.2 persons per household. Data was collected on community membership and ethnicity to understand the migratory history of the people and the dominant language spoken within the mine-take communities. The data reveals that most of the respondents were natives with only a few being non-natives (Table 4.1).

Kenyasi No. 2 had a majority of the study respondents being natives 138 (46.5%). Generally, however, it is established that the study population was predominantly made up of natives in all mine-take communities studied. This makes the participants appropriate for the study as they are ordinarily expected to have a deeper understanding of the historical evolution of the community and the operations of the mine. Meanwhile, a good number of the participants, averaging 20 percent of the sampled population migrants who had had a prolonged engagement in the communities. This implies that the sample also contained respondents, who though non-natives, have lived long enough in the mine-take communities and possessed the requisite experiential knowledge to provide an accurate account for how the communities have transitioned economically and socially over time. This, in part, justifies the composition of the study sample as being appropriate for this study.

Table 4. 1: *Sampled Study Participants by Community*

Community	Frequency	Percentage
Kenyasi No. 2	163	44.9
Kenyasi No. 1	82	22.6
Ntotroso	70	19.3
Gyedu	29	8.0
Wamahinso	19	5.2
Number of people in household (Average = 5)		
< 2	57	15.7
3-5	221	60.9
> 5	85	23.4

Source: *Summarised from Field Data (2021)*

A cross-section of traders and buyers at the Ntotroso market in the Asutifi north District source: thebftonline.com

The ethnic composition of the communities was also assessed. The Akan tribe comprising Asantes, Ahafos, and Bonos is the dominant ethnic group. The Akan tribe accounted for 139 (46.0%) participants in Kenyasi No. 2, 62 (20.5%) in Kenyasi No. 1, and 63 (20.9%) in Ntotroso. In all study communities, Akan was the dominant ethnic group. People of northern ethnicities (Wangaras, Kusase, Dagombas, Frafras/Grunis) were the next major tribe found within the mine-take communities. Per the study, Kenyasi No. 2 had more people of northern extraction 20 (47.6%), followed by Kenyasi No. 1, with Ntotroso and Gyedu recording 23.8 percent, 11.9 percent, and 16.7 percent, respectively. Also, 69.2 percent of the Ewes can be found in Kenyasi No. 1, whilst the only respondent who is Ga resides at Ntotroso (Table 4.2). This is a fair representation of the diverse ethnic groups in Ghana.

The dominance of the Akan tribe within the study communities is a testament to the fact that the communities are largely Akan settlements. According to the 2010 Population and Housing Census, the indigenes or natives are predominantly Akans who speak the Asante Twi. The mine-take communities have a record of peaceful coexistence between the various ethnic groups, a sine quo non for the pursuit of sustainable development.

Table 4. 2: Migratory History and Ethnicity of the Mine-take Communities

		Kenyasi No. 2	Kenyasi No. 1	Ntotroso	Gyedu	Wamahinso
Origin of Respondents	Native	138 (46.5%)	64 (21.5%)	53 (17.8%)	25 (8.4%)	17 (5.7%)
	Migrant	24 (37.5%)	18 (28.1%)	17 (26.6%)	3 (4.7%)	2 (3.1%)
	Others	1 (50.0%)	0 (0.0%)	0 (0.0%)	1 (50.0%)	0 (0.0%)
Ethnicity	Akan	139 (46.0%)	62 (20.5%)	63 (20.9%)	19 (6.3%)	19 (6.3%)
	Ewe	2 (15.4%)	9 (69.2%)	1 (7.7%)	1 (7.7%)	0 (0.0%)
	Ga	0 (0.0%)	0 (0.0%)	1 (100.0%)	0 (0.0%)	0 (0.0%)
	Northern extraction	20 (47.6%)	10 (23.8%)	5 (11.9%)	7 (16.7%)	0 (0.0%)
	Others	0 (0.0%)	1 (33.3%)	0 (0.0%)	2 (66.7%)	0 (0.0%)

Source: *Summarised from Field Data (2021)*

4.3 Gender, Age, Religion, and Marital Status of Respondents

The study also revealed variations in gender, age, religion, and marital status of the respondents (Table 4.3). The dominant gender among the study participants were males (197; 54.3%) with the females being 166 (45.7%). The dominance of male respondents in the study communities give credence to earlier reports (e.g. 2010 Population and Housing Census) of the predominantly male-headed households in most Ghanaian communities. This inference is largely informed by the fact that questionnaires were mainly targeted at heads of households who were deemed appropriate to better respond to the research questions. Under some instances, where the male household heads were not available, other members of the household were administered the questionnaire. The composition of respondents, therefore, reflects the generally documented male-dominated heads of households and therefore considered an appropriate and true reflection of the larger population in most Ghanaian communities.

Regarding the age distribution (Table 4.3), the study respondents aged between 31-40 years comprised 132 (36.4%) with those between 21-30 years accounting for 46 (12.7%). Furthermore, the population aged between 41-50 years comprised 21.1 percent of the study sample, whereas those between 51-60 years and those above 60 years, each represented 14.9 percent. The age distribution has a significant impact on the study findings. The Ahafo South mine started operations officially some 15 years ago, that is in 2006. Thus, with a majority of the study sample being above the age of 30 years, they could vividly account for the 'before' and 'after' effect of the mine on the economic and social sustainability of the mine-take communities. This inference is also largely informed by the fact that as earlier indicated, most of the study respondents are natives, and also, they being largely above 30 years means that they have a full understanding of the full life of the mine. Thus, they can give a detailed account of the situation pertaining to the selected mine-take communities from the time the mine was established in 2006 to the present situation.

In terms of the marital status, almost two-thirds (267; 73.5%) of the study sample are married, 63 (17.4%) are single with 6.1 percent and 3.0 percent being divorced or widowed. As regards the number of children by

the respondents, 40.2 percent of the respondents had between 3-5 children, followed by 39.1 percent having two (2) or fewer children. Also, 17.9 percent of the respondents had between 5-8 children and 2.8 percent had more than 9 children. Regarding the religious affiliation of the study respondents, 330 (90.9%) are Christians whereas 33 (9.1%) are Moslems. Christians according to the 2010 Population and Housing Census are the dominant religious groupings within the Asutifi North District and by extension same manifesting in the mine-take communities.

A cross-section of Youth in the Ntotoroso
source: facebook.com

Table 4. 3: *Gender, Age, Religion and Marital status of Respondents*

Demographic variable	Frequency	Percentage
Sex		
Male	197	54.3
Female	166	45.7
Age		
21-30	46	12.7
31-40	132	36.4
41-50	77	21.1
51-0	54	14.9
61+	54	14.9
Marital status		
Single	63	17.4
Married	267	73.5
Divorced	22	6.1
Widowed	11	3.0
Number of children		
0-2	142	39.1
3-5	146	40.2
6-8	65	17.9
More than 9	10	2.8
Religion		
Christianity	330	90.9
Islam	33	9.1

Source: *Summarised from Field Data (2021)*

4.4 Educational and Occupational Dynamics of Study Respondents

Data was also collected and analysed on key social attributes. Key areas of concern were educational and occupational status of the study participants (Table 4.4). The data on educational status generally revealed that respondents were fairly well educated with the majority having between JHS to tertiary level education (cumulatively 63.8%). Despite the high levels of attainment of formal education by the respondents, the majority of them worked in the informal sector. The levels of educational attainment of the study participants, partly explain why it was much easier conveying to them the purpose of the study and getting their informed consent.

Table 4. 4: *Educational and Occupational Status of Respondents*

Demographic variable	Frequency	Percentage
Educational attainment		
Non-formal	53	15.0
Primary	75	21.2
MSLC/JHS	106	29.9
Technician/SHS	94	26.6
Tertiary	26	7.3
Occupation		
Unemployed	17	5.0
Students/apprenticeship	6	1.8
Civil/public servant	28	8.2
Industrial sector	34	10.1
Service sector employee	51	15.1
Commercial sector	70	20.7
Agricultural sector	132	39.1

Source: *Summarised from Field Data (2021)*

From the data collected, most of the study respondents were employed in the agricultural sector (132; 39.1%), with 10.1 percent, 15.1 percent, and 20.7 percent being employed in the industrial, service sector, and commercial sector respectively (Table 8). The service sector comprised respondents who were mostly drivers, and tailors, with the commercial sector having people engaged in occupational activities such as trading and the preparation and selling of food. The assessment of the occupational status of the respondents was intended to provide a lens into the economic (in)stability of the study respondents in terms of their income and expenditures over the years. It also contributed to a more nuanced understanding of the economic sustainability of inhabitants of the mine-take communities.

4.5 Chapter Summary

The analysis shows that the individual participants in the study possess the characteristics of people living in the selected mine-take communities. From the analysis, it can be deduced that the educational level of the respondents is adequate, however, their occupational status is largely informal. With the majority of the participants being natives and also having stayed in the respective communities for more than 30 years, it is expected that their accounts of how the establishment of the Ahafo South Mine some 15 years ago has had an impact on the sustainable development of the communities will be fairly accurate.

Chapter 5
ECONOMIC SUSTAINABILITY

5.1 Introduction

This chapter explores the economic dimension in terms of jobs, income and expenditure stability of the study respondents in the selected mine-take communities. Economic sustainability is one key issue that affects communities within mining enclaves. This section of the report, therefore, presents an analysis of the respondents' income and their sources of income, their spending patterns, and the extent to which the mine has influenced their economic conditions generally.

5.2 Sources of Income of Respondents

The study revealed that there has been an increase in the monthly income of the respondents after the mine had been established. From the analysis (Table 9), there has been a reduction in the number of respondents who were earning less than GH¢ 500 from 55.8 percent before the mine was established to 35.5% after the Ahafo South Mine of Newmont Goldcorp Limited started. On the other hand, the proportion of respondents who also earn between GH¢ 1001-1500 saw a slight increase in 21.3 percent to 22.1 percent, likewise the proportion of respondents who earn above GH¢ 2500 also increased from 2.8 percent before the mine establishment to 5.5 percent after the establishment. Furthermore, sources of the study respondents' income were explored. It is evident from Table 5.1 that the majority of the respondents earn their income from non-mine-related activities. However, there has been a decline from 95.6 percent to 85.7 percent. On the other hand, income received by the study respondents as a result of their direct and indirect employment in relation to the mine saw an increase from 1.9 percent to 7.2 percent and from 2.5 percent to 7.2 percent respectively.

The increase in income resulting from the direct and indirect

employment of respondents in the mine is an indication that the establishment of the mine has had an important impact on the economic situation of inhabitants. Even though a majority of the respondents attest to the fact that their income sources are predominantly derived from non-mine activities such as agricultural, commercial, and service sectors (Table 5.1), these sources of income have reduced over the years since the inception of the mine. It can therefore be concluded that the establishment of the mine has had a positive impact on the livelihoods of the people. Also, with the average income levels of the respondents having relatively increased since the inception of the mine, it indicates that the mine has positively had an effect on the income levels of the respondents thereby increasing the economic sustainability of the mine-take communities.

Shop owner in the Asutifi North.
source: www.ircwash.org

Table 5.1: *Average Monthly Income and the Sources of Income*

Average Monthly Income				
Income	**Before Mine**		**After Mine**	
(GH¢)	Frequency	Percentage	Frequency	Percentage
Less than 500	202	55.8	129	35.5
501-1000	35	9.6	66	18.2
1001-1500	77	21.3	80	22.1
1501-2000	10	2.8	20	5.5
2001-2500	28	7.7	48	13.2
2500+	10	2.8	20	5.5
Income sources				
Employment directly related to the mine	7	1.9	26	7.2
Employment indirectly related to the mine	9	2.5	26	7.2
Non-mine related employment	347	95.6	311	85.7

Source: *Summarised from Field Data (2021)*

The mine has not only resulted in improved economic situation for inhabitants, but there has also been improvements in local government revenues. The revenues of the Asutifi North District Assembly has grown from GH¢ 2,870,783.58 in 2010 to GH¢ 13,484,549.66 in 2020, with Mineral royalties growing from GH¢ 1,125,212.76 to GH¢ 4,773,353.35 over the same period. This has situated the District Assembly in a better positon to offer improved socio-economic and development infrastructure to the communities within its jurisdiction (Personal interview with the District Planning Officer, February 2020).

Meanwhile, the Newmont Ahafo Development Foundation (NA-

DeF) an initiative of Newmont Goldcorp invests a significant portion of the resources of the foundation on economic empowerment of inhabitants within the mine-take communities. Some economic interventions by NADeF which support the long-term economic empowerment and wellbeing of the people include provision of micro-credit to community members (1881 beneficiaries as of 2018), support with capital loans for business start up for youth groups after apprenticeship (11 youth groups supported as of 2018), and ensured that 99 percent of contracts awarded went to local contractors (NADeF, 2018). In the year 2018 alone, the income from Newmont Goldcorp to NADeF was GH¢ 4,144,062.71. NADeF invests these resources on sustainable development initiatives within the mine-take communities in close collaboration with key stakeholders and the Sustainable Development Committees established for each mine-take community. Their interventions often span human resource development (24%), infrastructure (23%), social amenities (16%), economic empowerment (17%), natural resource protection (4%), cultural heritage (12%) and sports (4%) (NADeF, 2018).

5.3 Stability of Income

Per Table 5.2, respondents were generally of the view that their income is unstable (59.2%). Only 1.9 percent of the study participants were, however, of the view that their income is very stable whilst 24.8 percent claim it has been stable. Income instability is a major problem for most people. The predominant informal sector that employs many Ghanaians is usually affected by any 'shock' within the economy. The current COVID-19 pandemic has caused major havoc on the income levels of many people especially within the informal sector (agriculture, commercial, and service sector). Lockdowns and some other restrictions imposed by the government in some parts of the country, for instance, affected some aspects of the economy, thereby causing instability in the income levels of people that are employed in such sectors (service sector – teaching, driving, hospitality-related jobs, etc.)

A resident in Kenyasi No. 2 was of the view that:

"because of the mining activities in our communities, some of our

farmlands have been taken over by the concession. This has affected our agricultural output, leading to low productivity" (A respondent from Kenyasi No. 2, February 2021).

Another resident in Kenyasi No. 1, in corroborating the reasons for the stability/instability of their sources of income attest that the limited/unstable livelihood opportunities within the community are affecting income stability.

"Increasing cost of goods and services is another major problem facing our income stability. The prices of goods and services keep increasing whilst our sources of livelihood are also not stable. Sometimes, we seem to be outpriced in the market and therefore struggle sometimes to cope with these frequent increases" (Female respondent, Gyedu, February 2021).

The mine's influence on the income stability of the respondents was also assessed. About 68.0 percent of the respondents were of the view that the establishment of the mine has influenced the stability of their income, whereas 32.0 percent also thought otherwise. A qualitative study conducted on this issue identified some factors that the respondents alluded to as being key in the stability/instability of their income sources vis-à-vis the establishment of the mine.

A male respondent from Ntotroso was of the view that: "the establishment of the mine has led to many families losing their farmlands. My families' farmlands were taken over by the mine when they came into existence" (A male respondent from Ntotroso, February 2021).

Another person also opined that:
"there are limited job opportunities in the mine for the locals. Some people have tried to get employment in the mine but are not successful at it. Also, because of the mine, the prices of goods and services within our communities have increased. We those who do not work in the mine or do not have stable incomes are always out-priced, and we struggle to cope with the price increases" (Respondent from Wamahinso, February 2021).

From a divergent perspective, one of the respondents from Kenyasi No. 2 was of the view that the presence of the mine has provided them with diversified income opportunities. "Since the mine came and I was employed, I have been able to save money and open many businesses that have helped me to have a stable income. I have a mobile money business; I also operate a provision store alongside others. These are providing me income and it has made my income stable" (Respondent from Kenyasi No. 2, February 2021).

It was observed that for all those individuals and families that lost farmlands, appropriate compensation was paid to them. Anecdotal evidence which could not be corroborated because of Newmont's non-response to our request for an interview also indicates that Newmont has a land access and agricultural improvement programme that provides support to farmer groups. Indeed total land area under cultivation of maize, rice, cocoyam, cassava and plantain increased from 25,803 hectares in 2018 to 27,081 hectares in 2020. Accompanying this was an increase in total yield from 32,8210.6 in 2018 tons to 35,0948.4 tons in 2020 (Personal interview with the District Director of Agriculture, February 2020). Our interview with the District Director of Agriculture, however, suggested that food production fluctuates annually depending on general weather conditions which are often not within the control of the farmers.

Table 5.2: *Income Stability*

Income Status	Frequency	Percentage
Very stable	7	1.9
Stable	90	24.8
Unsure	20	5.5
Unstable	215	59.2
Very unstable	31	8.5
Mine Influence on Stability of Income		
Yes	247	68.0
No	116	32.0

Source: *Summarised from Field Data (2021)*

Water vendor in a business transaction in the Asutifi North District source: www.ircwash.org

5.4 Patterns and Stability of Expenditure

Expenditure patterns and expenditure stability were also identified as an indicator in assessing the economic sustainability of communities within mining enclaves. Expenditure on food, electricity, water, clothing, education, health, communication, rent, and transportation were assessed. From Table 5.3, average expenditure on food doubled from GH¢ 204 before the mine establishment to GH¢ 468 after the mine establishment, likewise the expenditure on utilities (electricity, water, and communication increased from GH¢ 30, GH¢ 14, and GH¢ 24 to GH¢ 80, GH¢ 37, and GH¢60, respectively). Interestingly, the expenditure on education increased to more than four folds from GH¢ 176 to GH¢ 776. The increase in the expenditure on all the stated items could be a result of the increase in the household size of the respondents.

The household size before the establishment of the mine is largely likely to be less than the household size after the establishment of the mine. The household heads who participated in the study could be members of a household as at the time the mine was established in 2006, as compared to the household head role they are currently playing. Regarding the expenditure on education, the cost of education in 2006 was much lower than the cost of education in 2021.

In assessing the expenditure stability of the study respondents in the selected mine-take communities, approximately a quarter (75.5%) were

of the view that their expenditure patterns were unstable, whilst 13.5 percent attest that their expenditure patterns have been stable (Table 5.3). The mine has also been seen as having an influence (86.0 %) on expenditure stability. It is important to note that since general economic indicators (inflation and exchange rate) have been consistently on the rise, there is much likelihood that it will have a direct effect on expenditure patterns, thereby causing instability in that regard. To buttress this assertion, the qualitative responses gave some reasons for these quantitative findings.

Table 5. 3: Expenditure Patterns

	Before Mine		After Mine	
Expenditure patterns	Frequency	Percentage	Frequency	Percentage
Expenditure on food	Mean = GH¢ 204		Mean = GH¢ 468	
< 50	41	11.3	1	0.3
51-100	85	23.4	41	11.3
101-300	199	54.8	80	22.0
301-500	20	5.5	149	41.0
> 501	18	5.0	92	25.4
< 10	111	30.6	14	3.9
11-30	201	55.3	68	18.7
31-50	26	7.2	89	24.5
51-100	10	2.8	135	37.2
> 100	15	4.1	57	15.7
Expenditure on water	Mean = GH¢ 14		Mean = GH¢ 37	
< 10	141	38.8	55	15.2
11-30	209	57.6	130	35.8
31-50	5	1.4	129	35.5
51-100	1	0.3	30	8.3

> 100	7	1.9	19	5.2
Expenditure on clothing	Mean = GH¢ 55		Mean = GH¢ 138	
< 20	82	22.6	33	9.1
21-50	67	18.5	53	14.6
51-100	190	52.3	70	19.3
> 100	24	6.6	207	57.0
Expenditure on education	Mean = GH¢ 176		Mean = GH¢ 776	
< 50	66	18.2	1	0.3
51-100	43	11.8	53	14.6
101-200	221	60.9	58	16.0
> 200	33	9.1	251	69.1
Expenditure on health	Mean = GH¢ 53		Mean = GH¢ 119	
< 50	132	36.4	100	27.6
51-100	221	60.9	44	12.2
> 100	10	2.7	218	60.2
Expenditure on communication	Mean = GH¢ 24		Mean = GH¢ 60	
< 10	116	32.0	73	20.1
11-20	12	3.3	55	15.2
21-30	203	55.9	26	7.2
31-50	20	5.5	32	8.7
> 50	12	3.3	177	48.8
Expenditure on rent	Mean = GH¢ 39		Mean = GH¢ 118	
< 20	79	21.8	5	1.4
21-50	271	74.6	58	16.0
51-100	4	1.1	67	18.5
101-200	4	1.1	226	62.3
> 200	5	1.4	7	1.8

Expenditure on transportation	Mean = GH¢ 32		Mean = GH¢ 86	
< 20	118	32.5	45	12.4
21-50	228	62.8	85	23.4
51-100	13	3.6	177	48.8
> 100	4	1.1	56	15.4

Source: *Summarised from Field Data (2021)*

Table 5.4: *Expenditure Stability*

Status	Frequency	Percentage
Very stable	6	1.7
Stable	49	13.5
Unsure	18	5.0
Unstable	274	75.5
Very unstable	16	4.4
Mine influence on stability of expenditure		
Yes	312	86.0
No	51	14.0

Source: *Summarised from Field Data (2021)*

A resident from Wamahinso attests that:
"I see my expenditure as being unstable since my household size has been increasing. As it stands now, I have 4 children and my expenditure on food, utilities, health, education, and clothing will definitely increase" (A respondent from Wamahinso, February 2021).

A native of Kenyasi No. 2 also noted that:
"my income has been relatively unstable because prices of goods and services are always increasing, and we need these goods and services to survive. The increases are as a result of increasing inflation" (A respondent from Kenyasi No. 2, February 2021).

5.5 Food and Influence of Mining on Food Availability

Food availability has been seen as one of the indicators of economic sustainability in many communities. To the respondents, 13.8 percent were of the view that food is always available all year round, 27.3 percent said food availability depends on the season, 15.4 percent also attest that there are fluctuations in food availability between years depending on weather and other inputs, whilst 43.5 percent, on the contrary, said food availability is also an issue of concern (Table 5.5). A substantial number, 87.1 percent of the study participants claim the establishment of the mine has influenced food availability/unavailability. Some of the issues the respondents alluded to as being reasons for food availability/unavailability are: seasonal variation in crop productivity; loss of farmlands; increasing prices due to high financial capacity of mine workers; reduced interest in farming as a result of the attractiveness of the mine work; and the increasing demand on agricultural produce. The views expressed by repondents conflicts with the evidence collected from the District Directorate of Agriculture as already presented under section 5.3.

A resident in Ntotroso remarked that:
"My farmlands have been taken away by the mine and I now do not have a farm where I can plant, grow and harvest my own food". (Male resident of Ntotroso, February 2021).

A native of Wamahinso also attests that food availability is becoming an issue. He was of the view that:
"most of the youth do not see the value in farming any longer and are all seeking for greener pastures in the mine and other areas. This has led to a reduction in farming and that is leading to food unavailability. If we do not address this issue, all the youth will abandon farming and go for the lucrative jobs in the mine" (A native of Wamahinso, February 2021).

Table 5.5: *Food and Influence of Mining on Food Availability*

Food availability	Frequency	Percentage
Yes, always	50	13.8
Depends on the season	99	27.3
Fluctuations between years	56	15.4
No	158	43.5
Mine influence on food availability		
Yes	316	87.1
No	47	12.9

Source: *Summarised from Field Data (2021)*

5.6 Likelihood of Employment in the Mining Company

Aside sources of income and expenditure patterns, the likelihood of gaining employment with Newmont Goldcorp Limited was also assessed as it is of essence in assessing the economic sustainability of the mine-take communities (Table 5. 6). Cumulatively, 64.2 percent of the respondents noted that it was unlikely to gain employment in the mine, whilst 24.8 percent also cumulatively attest that it was easy to be gainfully employed in the mine. Several factors could account for the high percentage of respondents who claim it was unlikely to get employment in the mine. Some of these include applicants not having the requisite qualifications, the limited job opportunities available in the mine, and the lack of transparency in the recruitment process.

A respondent from Gyedu, speaking on the likelihood of being employed in the mine observed that:
"I have the minimum qualification to be employed in the mine, however, I was not given the opportunity because I could not get anyone immediately to 'hold my hand' which has been the case of late" (A native of Gyedu, February 2021).

Table 5.6: *Likelihood of Employment in the Mine*

Likelihood of employment in the mine	Frequency	Percentage
Very likely	13	3.6
Likely	77	21.2
Not sure	40	11.0
Unlikely	119	32.8
Very unlikely	114	31.4

Source: *Summarised from Field Data (2021)*

It must however, be indicated that while securing a job in the mine is competitive, anecdoctal evidence from the communities, not corroborated by Newmont suggests that unskilled jobs are reserved for the community members. It may also be important for people within the mine-take communities to take up other opportunities offered by NADeF or take advantage of their initiatives to enhance their skills and competitiveness not only for the purpose of being engaged by the mine but other companies that have been attracted to the area due to the presence of Newmont.

Chapter Summary

This section of the analysis explored the economic sustainability of the mine-take communities. From the analysis, the respondents' average income was seen to have increased after the mine was established in 2006. To them, their average income is unstable, as a result of issues such as low agricultural productivity, loss of farmlands, and the increasing cost of goods and services. On average, their expenditure before the mine has relatively increased since the inception of the mine, even though their expenditure is unstable as a result of increasing household sizes alongside the relative increase in goods and services as a result of increasing inflation and exchange rates. On the issue of food availability, the respondents noted that food availability is becoming a problem issue as a result of the loss of farmlands and also the youth seeking alternative employment opportunities at the mine at the expense of their traditional occupation, agriculture. The likelihood of being gainfully employed in the mine, to the respondents, is very unlikely due to lack of the required skills and the lack of transparency in the recruitment process among others.

Chapter 6
SOCIO-POLITICAL SUSTAINABILITY

6.1 Introduction

Another key objective of the study was to examine the social sustainability within the context of resource extraction and sustainable development within the communities that are directly affected by the mining activities of Newmont Goldcorp Limited. The objective was to understand issues of voice and accountability and as a result this section takes into consideration issues pertaining to land access, access to information, payment of royalties, and the vulnerability, adaptation, and sustainability practices within the mine-take communities.

6.2 Access to Land

Land ownership in Ghana falls under two main categories. They are customary lands (lands owned by stools/skins, families/clan) usually held in trust by the chief, head of family, clan, or fetish priests for the benefit of members of the group; and public lands (government/state lands) usually acquired from chiefs/family for use by government for the purposes of development. Evidence from the study suggests that accessing customary land in the form of family land is the predominant way (65.7%) by which land can be accessed in the various communities. Other ways by which lands can be accessed include through share cropping (26.2%) and grants (7.7%) (Tanle 6.1). For the purposes of accessing land for agricultural activities, share cropping becomes an easier way to access land. In this regard, family lands are rented or leased out to prospective farmers to use for a specified period of time as well as sharing the harvested crops with the landowner based on a pre-determined sharing method. For non-natives, this is an easier way to access land.

The respondents also observed that, accessing land within the communities has not changed that much since the mine started commercial operations with 71.9 percent of the respondents attesting to this fact. To those who noted that accessing land has changed since the inception of the

mine, they attributed this to loss of farmlands, scarcity of land, fear of losing lands, increasing value placed on lands, and increasing pressure on farmlands.

In acknowledging the changed nature of access to land, a resident in Ntotroso put it thus;
"My family land was readily accessible to me for farming. However, parts of my family land has been taken over by the mine and what is left is not enough for us to use to cultivate our crops. Because of the growing demand for land, it takes several pleas and efforts to get lands from other families" (A native of Ntrotroso, February 2021).

Another also posits that, *"due to the mine operation within this area, some parts of our land has been taken over leading to scarcity of land. I used to take land from a family to cultivate my crops, but now it's a bit difficult to get land to farm since am also not a native of this area" (A migrant in Kenyasi No. 2, February 2021).*

Table 6. 1: *Access to Land in the Mine-take Communities*

Land Accessibility	Frequency	Percentage
Family inheritance	238	65.7
Grants	28	7.7
Share cropping	96	26.6
Different before mining?		
Yes	102	28.1
No	261	71.9

Source: *Summarised from Field Data (2021)*

6.3 Access to Essential Information

To every person, access to information is the surest way to be abreast with issues. Since the mine started operation, there has been several mediums that information concerning the mine has been made accessible to the inhabitants of various mine-take communities. In this regard, 80.7 percent of the study respondents attested that the mine provides them with information concerning their activities and other information that the mine thinks will be of benefit to them (Table 6.2).

Staff of Newmont Goldcorp providing information on activities of the company.
source: facebook.com (NADeF)

Table 6. 2: *Access to Essential Information*

Provision of information	Frequency	Percentage
Yes	293	80.7
No	70	19.3
Participation in information sharing sessions		
Yes	265	73.0
No	98	27.0
Type of information provided		
Employment opportunities	192	71.6
Compensation	13	4.9
Blasting	51	19.0
Pit closure	1	0.4
Health and safety	2	0.7
Others	9	3.4
Frequency of engagement by the mining company		
Monthly	18	6.7
Quarterly	32	12.0
Yearly	15	5.6
As and when necessary	179	67.0
Others	23	8.6
Participation in information sessions		
Everybody	120	44.3
Adult females only	1	0.4
Youth groups only	15	5.5
Chiefs and opinion leaders only	45	16.6
Depends on the purpose of the forum	84	31.0
Others	6	2.2

Source: *Summarised from Field Data (2021)*

As regards to whether the community members do participate in the information sharing sessions, 265 (73.0%) were in the affirmative whilst 27.0 percent did not attest to this fact. To them information from the mine concerning employment opportunities ranks high (71.6%), followed by information concerning blasting (19.0%) and information regarding compensations (4.9%). Most often (67.0%) information is given by the mines as and when necessary or requested by the stakeholders, whilst the respondents also agreed that they do give information on monthly basis (6.7%), quarterly (12.0%) and yearly (5.0%). According to the respondents, everyone (44.3%) can participate in the information sharing process. To others also, the meetings with the mines for the purposes of sharing information is usually done with the chiefs, elders and opinion leaders (16.6%) and also depending on the purpose of the meeting invitation is sent to either all or a section of the community (31.0%).

6.4 Payment of Royalties

Royalties are payment to owners of a property for use of that property. In the situation of mining companies, royalties are the payments made by mining companies for the value of the non-renewable resources which they mine from a community. As pertaining to the Minerals Law in Ghana, royalties are paid to the state and the communities that own the non-renewable natural resources which are being mined. The study therefore sought to explore the study respondents' knowledge on the payment of royalties. More than three-quarters (76.0%) of the respondents knew about the payment of royalties, whilst 18.0 percent were of the view that they have no idea on the payment of royalties by the mining company. To those who had knowledge on the payment of the royalties, it was either being paid annually (66.9%) or quarterly (23.7%).

Royalties are supposed to be used for development by the government and or the community that it is being paid to. For the respondents, majority, 82.7 percent, agreed that the royalty being paid is used for infrastructure development, 11.6 percent also opined that it is being used to serve as scholarship schemes for students who hail from the mine-take communities. A whopping majority (86.9%) of the respondents were also of the view that the chiefs are those who control the royalties and what they are being used for. This is not surprising because the chiefs are seen as the custodians of the land and are therefore entrusted, on behalf of the people, to determine how royalties are to be used. In general, 88.4 percent of the respondents also attest that they do not participate in process to determine the use of the royalties paid and only 11.6 percent assenting that they participate in the process to determine the use of the royalties. Some of the views of those who participated are:

"In that particular meeting that I was part of, we agreed that the royalties should be used to help us establish a university. This university is supposed to train our youth so that they can also be gainfully employed in the mine" (A 36 year old respondent, February 2021).

"We concluded at one of the meetings that, part of the royalties should be used to construct boreholes in communities that have difficulty in accessing water. Some of the chiefs also wanted to rebuild their palaces so we also agreed that a portion should also be used to give a facelift to our palaces" (A 45 year old respondent, February 2021).

"We do not have any standard market to boast of in our communities. Hence it was also agreed that we establish modern markets for all the mine-take communities so that our women and youth could have comfortable places to carry out their

trade" (A female respondent, February 2021).

As regards to the issue of transparency in the use of the royalties, the study respondents also were of the view that there is no transparency in the determination and the use of the royalties that are being paid to the communities. More than three-quarters (79.6%) of the respondents were of the view that there was no transparency in the use of the royalties paid, with 20.4 percent also agreeing that there is transparency. A respondent who disagreed on the issue of transparency, had this as his reason:

"Some of the projects have outlived their construction durations and we continue to ask ourselves where the money is. We believe some of our chiefs, elders and opinion leaders are not telling us the truth. There is no transparency" (A male respondent, February 2021).

For those who said there was transparency, one of such proponents noted that:

"To me, I think there has been transparency in the use of the mining royalties. I know some of the students who have been given scholarships to further their education" (A male respondent, February 2021).

"All projects executed have been duly completed and I am of the view that it is because of the transparency in the process. Also, there are periodic community meetings in the various communities, and we are told what the royalties would be used for" (A male respondent from Kenyasi, February 2021).

Table 6.3: *Payment of Royalties*

Payment of Royalties	Frequency	Percentage
Yes	276	76.0
No	20	5.5
I have no idea	65	18.0
Frequency of Payment		
Quarterly	66	23.7
Annually	186	66.9
Others	26	9.4
Use of Mining Royalties		
To build infrastructure	229	82.7
To provide scholar-ships	32	11.6
To create alternative jobs	5	1.8
Others	11	4.0
Controlling Usage of Mining Royalties		
Chiefs	245	86.9
Assembly members	12	4.3
Others	25	8.9
Participation in the process of determining the use of royalty payment		
Yes	42	11.6
No	321	88.4
Transparency and Sustainability in the use of Mining Royalties		
Yes	74	20.4
No	289	79.6

Source: *Summarised from Field Data (2021)*

6.5 Vulnerability, Adaptation and Sustainability

In so far as mining is ongoing within the mine-take communities, there would be issues of vulnerability, adaptation, and sustainability in aspects of the mine and the impacts of its activities on the communities.

6.5.1 Vulnerability

On the issue of vulnerability, the unprotected and high value ecosystems are most vulnerable due to the impacts of mining. The main vulnerability challenges posed is in relation to pollution (water, air, and noise). To the respondents they were of the view that mining in their communities have made them vulnerable and exposed to a variety of health-related hazards. Some noted that:

"Acid-mine drainage, contamination of soil, ground and surface water can lead to health issues and subsequently have negative impacts on our environment which will also affect our agricultural practices and some of our traditional livelihood activities" (A native of Wamahinso, February 2021).

"Mining in our community has exposed us to a lot of dangers. Our roads are not tarred, and these heavy-duty mining trucks continue to ply it and create dust in the atmosphere that is posing as a great health challenge to us. There are also cracks in our buildings due to the blasting, some of our water bodies have also been polluted. To me, the mine is taking a lot from us and giving us a lot of problems. At times the blasting makes us to panic and the sound is scary sometimes" (A native of Ntotroso, February 2021).

Another resident from Kenyasi No. 2 attest to the issue of vulnerability and noted that:

"Our roads are bad, our youth are unemployed, some of the uncovered pits are dangerous, and the health risks are enormous. In any serious mining community, our basic needs have to be met. In fact, we very vulnerable to this mining activity on-going in our communities" (A native of Kenyasi No. 2, February 2021).

6.5.2 Adaptation

Adaptation strategies are usually adapted to help mitigate against issues of risks. It usually offers the potential of reducing future economic, environmental, and social costs. Within the mine-take communities, several adaptation strategies are being employed to help deal with the vulnerabilities of mining within the communities. To the respondents:
"A committee attended to the issues of cracks and got compensation for the victims whose buildings suffered from cracks as a result of blasting. Aside this also, the mine has been entreated to create awareness when there would be blasting so that it doesn't come as a surprise to people. So far they are adhering to their blasting schedules" (A male respondent, February 2021).

"To address the issues of acid rains, a mobile van mostly goes through all the mine-take communities during the rainy season to alert the communities not to use rainwater for cooking. On the issue of water, there are alternative water sources that are being constructed in some communities so that they minimize their over-reliance on rainwater" (A female respondent, February 2021).

"NADeF, has also been on hand to help us solve some of our challenges. NADeF has really helped us to get some social amenities for our people so that they can also be comfortable in their community"

6.5.3 Sustainability

For the communities to fully develop and become economically and socially sustainable, they need the support of the Newmont Goldcorp. Even though the communities own the resources, they cannot mine same.
In recognising the need for support from the mining company, a resident pointed out that:

"We need to build more infrastructure for the community, such as ICT Lab for the schools, clinics, and roads" (A respondent from Gyedu, February 2021).
Another respondent noted that:
"We need the mine to create job opportunities for all categories of people. Some of us do not have the necessary certificates, but we need jobs for

such people so that we can also do to earn a living. It would also be good if every household could get at least one child to be sponsored for further education" (A respondent from Kenyasi No. 1, February 2021).

6.6 Chapter Summary

Social sustainability as discussed in this chapter, dealt with issues of access to land, access to information from the mining company, and the payment of royalties. The evidence show that access to land is mainly from families, while migrants tend to rely on share cropping systems in order to have access to land. In terms of access to information, the evidence shows that inhabitants of the mine-take communities have access to information from the mining company and that everyone is invited to the regular open fora. To them, the royalties being paid are basically used for infrastructure and the provision of scholarships. They have, however, raised concerns about blasting, poor roads, pollution, and acid rain having an effect on their agricultural produce. Even though these concerns abound, they are hopeful that committees established have so far managed to solve some of their problems. They also seek for more support from the mining company so that they can be economically and socially sustainable and resilient.

Chapter 7
ENVIRONMENTAL SUSTAINABILITY

7.1 Introduction

This chapter examines the environmental impacts of mining in the study area. The chapter presents the results of GIS and remote sensing analysis to assess the extent and patterns of land use and land cover (LULC) changes in the study area. The results are presented in pre-and post-mining sequences to establish a clear trend of the impact, if any, of mining on the LULC dynamics of the study area.

An aerial view of Newmont Ahafo mine

source: The National and Regional Socio-Economic Impact of Newmont Ghana's Ahafo Mine by Dr. René Kim, Tias van Moorsel and Prof. Ethan B. Kapstein (Report 2013)

7.2 LULC Patterns for 1990 (Pre-mining)

Analysis of the 1990 image revealed variation in the area coverage of the different land cover classes in the study area. As expected, closed forests covered the largest area (554.716km2) representing 59.3% of the landmass. This was followed by open forest and cropland which covered 239.6km2 and 126.7km2 representing 25.6% and 13.5% of the area, respectively. The lowest land cover class in the study area were settlements/bare land and water bodies covering estimated areas of 14.424km2 and 0.111km2 representing 1.5% and 0.012% of the area coverage. The mining site was absent and therefore recorded no area coverage (Figure 7.1).

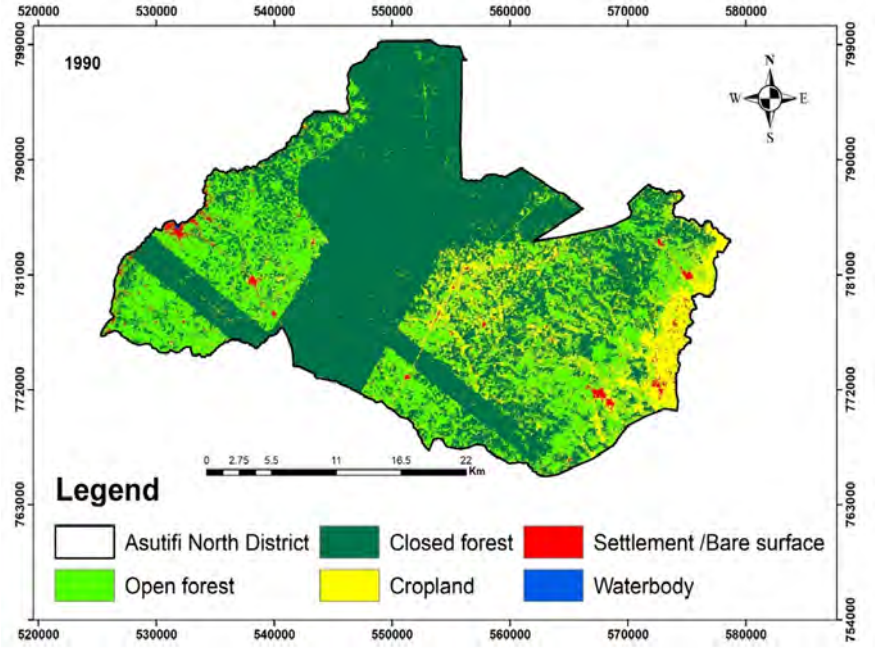

Figure 7.1: *LULC Map for 1990*

Source: *Author's construct (2021)*

7.3 LULC Patterns for 2000 (Pre-mining)

The 2000 image analysis revealed variation in LC classes from the base year as human activities began to increase in the study area due to an increase in population. The closed forest which represented the most dominant land cover class in the base year (1990) lost its dominance to the open forest. The closed forest covered an estimated area of 305.4km2 (32.7%) while the open forest covered 413.4km2 (44.2%). Similar to the open forest, croplands also experienced an increase in area coverage from the base year covering 207 km2 which represents 22.1% of the area. Settlements/bare lands on the other hand experienced a decrease in area coverage from the base year. The class covered 9.6km2 (1.0%) while the water body class covered 0.1km2 (0.012%) having maintained its area coverage from the base year. The mining site, however, did not record any area coverage as mining activities had not started in the area within this period (Figure 7.2).

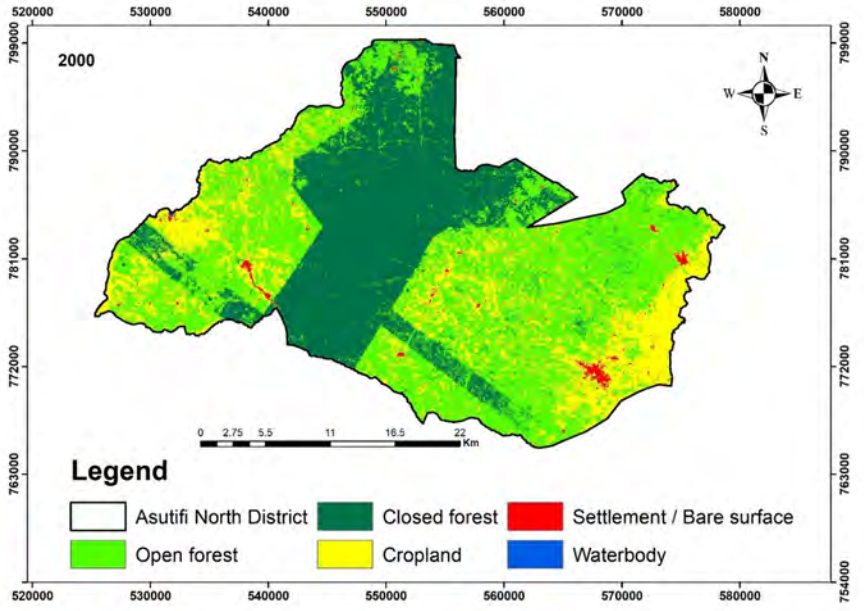

Figure 7.2: *LULC Map for 2000*

Source: *Author's construct (2021)*

7.4 LULC Patterns for 2010 (Post-mining)

In 2010, the open forest class experienced a significant increase in area coverage and became the most dominant land cover class in the study area. It covered an estimated area of 552.3km2 representing 59% of the total area. This was followed by the closed forest which covered an estimated area of 307.2km2 (32.8 %) having experienced a marginal increase in area coverage from the previous year of reference. Settlements/bare lands and water bodies also experienced marginal increases from the previous year of reference and covered 11.4km2 (1.2%) and 2.1km2 (0.2%), respectively. The cropland, however, lost a significant portion of its area from the previous year of reference covering only 45.6km2 (4.9%) while the mining site covered 17km2 representing 1.8% of the area (Figure 7.3).

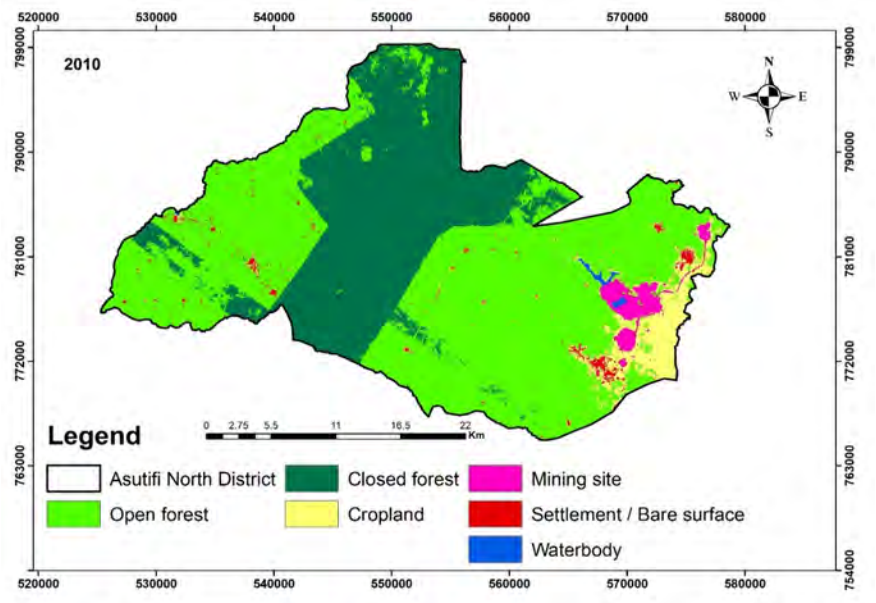

Figure 7.3: *LULC Map for 2010*

Source: *Author's construct (2021)*

7.5 LULC Patterns for 2020 (Post-mining)

The 2020 image analysis revealed highly significant variations in land cover patterns of the study area compared to the previous years of reference. The open forest class which represented the most dominant land cover class in the previous year of reference experienced a significant decrease in area coverage occupying 390.7km2 (41.8%) of the total landmass. The closed forest covered 376.2km2 (40.2%) having experienced an increase in area coverage from the previous years of reference due to an increase in afforestation programmes in the area and reclamation of mined areas within the mine concession. Croplands and settlements/ bare lands also covered 126.9km2 (13.6%) and 24.8km2 (2.7%) having experienced significant and marginal increases in area coverage from the previous years of reference respectively due to an increase in population and demand for food and housing. The water body experienced a marginal increase in area coverage from the previous year of reference and covered 2.2km2 (0.2%) while the mining site covered 14.7km2 (1.6%) having experienced a decrease in area coverage from the previous year. These may be due to the expansion of

the environmental control and tailings dams due to increasing production, construction of fish ponds, and reclamation of mined-out areas in the mining concession onto other land uses such as forests and farmlands (Figure 7.4).

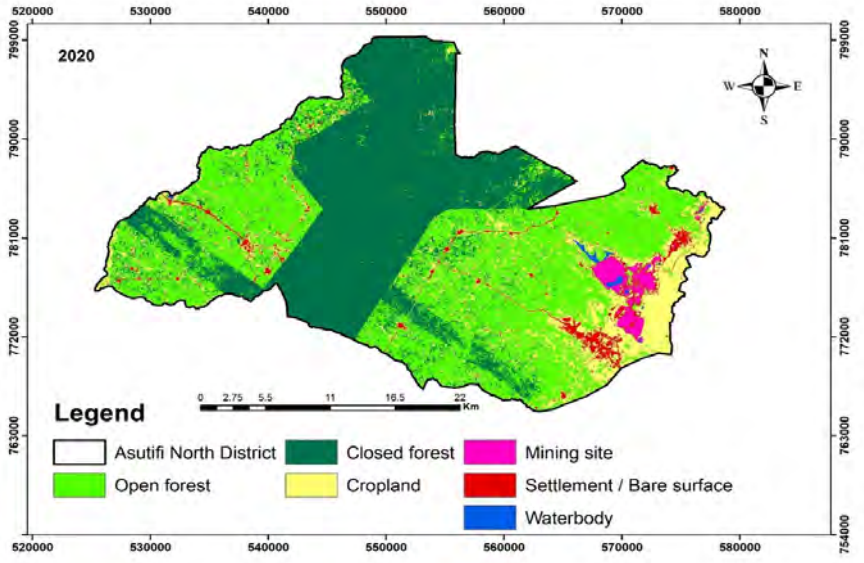

Figure 7.4: *LULC Map for 2020*

Source: *Author's construct (2021)*

Analysis of the annual rate of change in land cover classes over the entire study period revealed that the open forest increased by a rate of 0.5% annually. This was followed by the mining site, settlements/bare lands, waterbody, and croplands which increased by rates of 0.052%, 0.037%, 0.008%, and 0.001% annually. The closed forest on the other hand decreased by an annual rate of 0.6% over the entire study period (Table 7.1).

Table7.1: *Distribution of LULC for the periods 1990, 2000, 2010, 2020 and annual rate of change from 1990 to 2020*

LULC Types	1990	%	2000	%	2010	%	2020	%	Annual rate of change 1990-2020
	km2	%	km2	%	km2	%	km2	%	%
Open forest	239.560	25.608	413.373	44.189	552.278	59.037	390.655	41.760	0.538
Closed forest	554.716	59.298	305.413	32.648	307.175	32.836	376.196	40.215	-0.636
Cropland	126.661	13.540	207.022	22.130	45.620	4.877	126.875	13.563	0.001
Mining site	0.000	0.000	0.000	0.000	16.971	1.814	14.684	1.570	0.052
Settlement / Bare surface	14.424	1.542	9.554	1.021	11.366	1.215	24.847	2.656	0.037
Waterbody	0.111	0.012	0.110	0.012	2.061	0.220	2.216	0.237	0.008

Source: *Author's construct (2021)*

7.6 LULC Transitions between 1990 and 2000 (Pre-mining)

The study revealed a total of fifteen transitions in LULC classes in the study. This section presents the decadal trend of transitions between the LULC classes between 1990 and 2000. The section also examines the LULC classes contributing to the changing patterns in each class in the study.

7.6.1 Gains and losses in LULC classes between 1990 and 2000 (Pre-mining)

Between 1990 and 2000, the study area experienced major transitions between the various land use and land cover classes. Increases in human settlements, agricultural activities, and open forests resulted in a corresponding decrease in the area of closed forests by 251.1km2 (58.1%). The closed forest gained only 1.8km2 (0.4%) from the same LULC classes. Similarly, croplands also lost 64.6 km2 (14.9%) to the closed forest, open forests, and settlements and gained 144.1km2 (33.5%) from the same LULC classes while the open forest lost 106.0km2 (24.5%) to the closed forest, cropland, and settlement and gained 279.9km2 (64.8%) from croplands, settlements, water bodies, and closed forests. Settlements lost 10.5km (2.4%) to closed forest, cropland, open forest, and waterbodies. Settlements, however, gained 0.0027km2 (0.0006%) from the closed forest, croplands, open forests, and water bodies. Water bodies lost 0.0036 km2 representing 0.0008% of the area with no gain from the other LULC classes (Figure 7.5, Table 7.2).

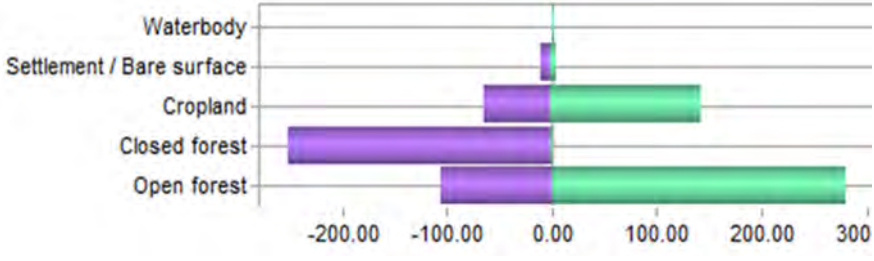

Figure 7.5: *Gains and Losses in LULC Classes between 1990 and 2000 (Pre-mining)*

Source: *Author's construct (2021)*

7.6.2 Net change in LULC classes between 1990 and 2000 (Pre-mining)

Estimation of the net change in LULC classes in the study area between 1990 to 2000 revealed a net reduction in area coverage of closed forests, water bodies, and settlements while open forests and croplands experienced net increases in their area coverage. Throughout the reference period the water bodies, settlements, and closed forests were reduced by 0.0036 km2, 10.5 km2, and 249.3 km2 representing 0.0008%, 2.4%, and 57.7%, respectively. The cropland and open forest on the other hand recorded a net gain of 79.5 km2 and 173.9 km2 representing 18.6% and 40.3%, respectively (Figure 7.6, Table 7.2).

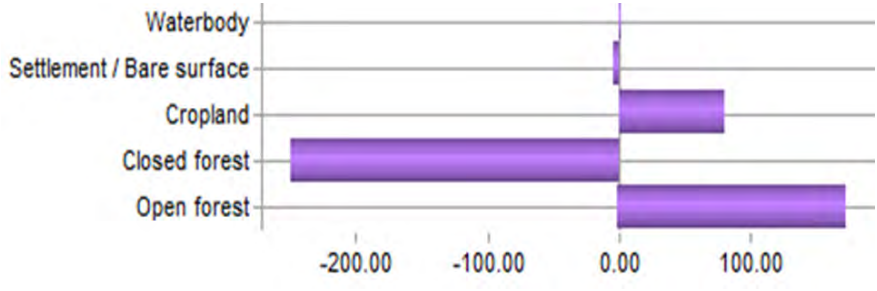

Figure 7.6: *Net Change in LULC Classes between 1990 and 2000 (Pre-mining*

Source: *Author's construct (2021)*

7.6.3 Contribution to net change in cropland between 1990 and 2000 (Pre-mining)

The study further explored the LULC classes contributing to the net change in area coverage of agricultural lands. The study revealed that land uses such as closed forests, open forests, and settlements collectively contributed to a net reduction in the area coverage of croplands by 64.6 km2 representing a 14.9% loss in its area coverage. The closed forests, open forests, and settlements contributed 1.2879km2, 60.957km2, and 2.3526km2 representing 0.3%, 14.1%, and 0.5%, respectively to the net reduction in area coverage of croplands. On the other hand, the croplands also experienced a net gain of 145km2 (33.5%) from these land uses with the closed forest, open forest, and settlements contributing 33.2km2 (7.7%), 103.3km2 (23.9%), 8.5km2 (2%) to this gain, respectively

(Figure 7.7, Table 7.2). This implies that within the period under consideration, significant portions of closed forest, open forest, and settlements were converted into agricultural lands as the population of the study area increased.

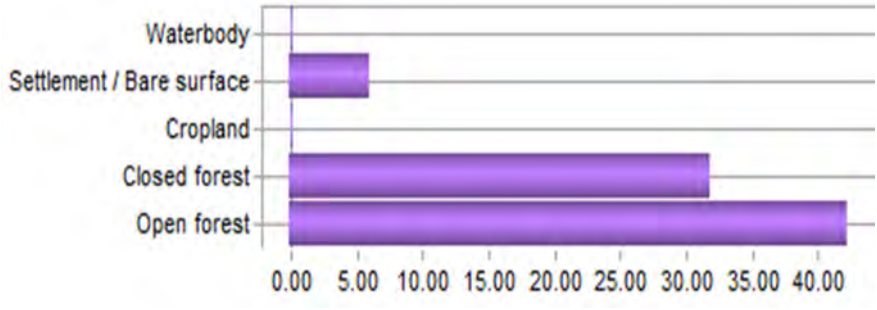

Figure 7.7: *Contribution to Net change in Cropland between 1990 and 2000 (Pre-mining)*

Source: *Author's construct (2021)*

7.6.4 Contribution to net change in open forest between 1990 and 2000 (Pre-mining)

Open forests in the study area experienced major transitions with the other LULC classes between 1990 to 2000. Though the open forest lost marginal portions of its area to closed forest 1.3km2 (0.3%) and settlements 2.4 (0.5%) and a significant portion to croplands 103.3km2 (23.9%), it also gained from land use such as cropland, bare lands, water bodies and more significantly from closed forest. The croplands, bare lands, water bodies and closed forests contributed 61km2 (14.1%), 2km2 (0.5%), 0.0009km2 (0.0002%), and 216.9km2 (50.2%) to the net gain in area coverage of closed forest, respectively (Figure 7.8, Table 7.2). It is therefore evident that the land use which was significantly impacted by the expansion of open forest within the pre-mining period is the closed forest.

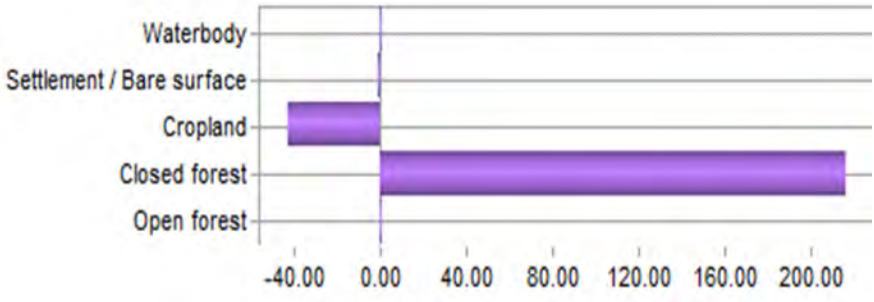

Figure 7.8: *Contribution to Net change in open forest between 1990 and 2000 (Pre-mining)*

Source: *Author's construct (2021)*

7.6.5 Contribution to net change in closed forest between 1990 and 2000 (Pre-mining)

Between 1990 to 2000, the closed forest lost an estimated 251.1km2 representing 58.1% of its area to land uses such as croplands, open forests, and settlements. The contribution of croplands, open forests, and settlements to the net reduction in area coverage of closed forests was estimated at 33.2km2, 216.9km2, and 1.0km2 representing 7.7%, 50.2%, and 0.2% of its area, respectively. Though the closed forest gained an estimated 1.3km2 (0.3%), 0.4km2 (0.1%), and 0.05km2 (0.01%) from the croplands, open forests, and bare land, these gains do not make up for the losses (Figure 7.9, Table 7.2). This implies that the rate of deforestation is higher than the rate of afforestation. Also, forest land conversion to agriculture and open forest or fallow lands were the major contributors to forest degradation within these years of reference.

Cropland in the Asutifi North District
source: www.anamwash.com

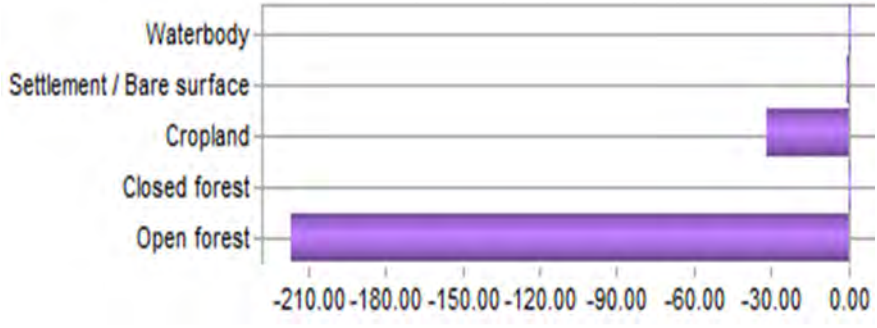

Figure 7.9: *Contribution to Net change in closed forest between 1990 and 2000 (Pre-mining)*

Source: *Author's construct (2021)*

7.6.6 Contribution to net change in water between 1990 and 2000 (Post-mining)

The pre-mining period also experienced a marginal transition between water bodies and other LULC classes in the study area. Water bodies lost a total of 0.0036km2 (0.0008%) to some LULC classes with the open forest and settlements contributing 0.0009km2 (0.0002%) and 0.0027km2 (0.0006%) to this loss. Though the water bodies gained 0.0027km2 (0.0006%) from bare areas through the construction of fish ponds in the area, this change did not make up for the loss resulting in a net decrease in area coverage of water bodies in the study area between 1990 and 2000 (Figure 7.10, Table 7.2)

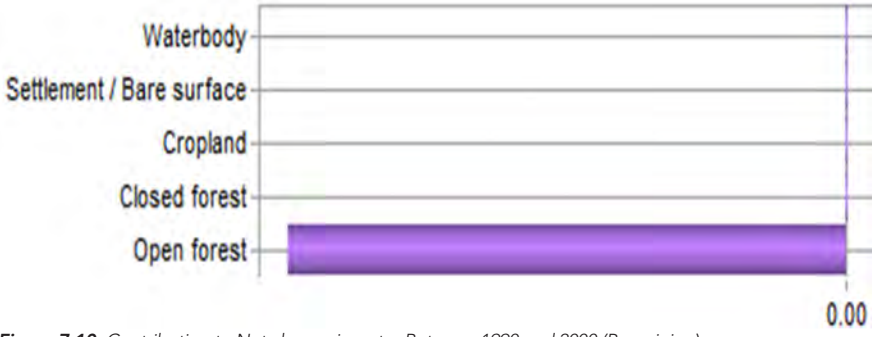

Figure 7.10: *Contribution to Net change in water Between 1990 and 2000 (Pre-mining)*

Source: *Author's construct (2021)*

7.6.7 Contribution to net change in settlements/bare land between 1990 and 2000 (Pre-mining)

Transitions in settlements/bare land in the study area largely happened between LULC classes such as closed forests, croplands, open forests, and water bodies. A total of 10.5km2 (2.4%) of the bare areas were lost to these LULC classes with the cropland making the most significant contribution to this loss 8.5km2 (2%). This was followed by the open forest, closed forest and water bodies contributing 2km2 (0.5%), 0.05km2 (0.011%) and 0.0027km2 (0.0006%) to this loss, respectively. Though the settlements/ bare lands made gains of 5.7km2 (1.3%) through transitions into the closed forest 1.0km2 (0.2%), croplands 2.4km2 (0.5%), open forests 2.3km2 (0.5%), and water bodies 0.0027km2 (0.0006%), these gains were not equivalent to the losses resulting in a net reduction in the area of bare lands largely to agricultural activities. This observed trend may be attributed to an increase in population and demand for food in the area (Figure 7.11, Table 7.2).

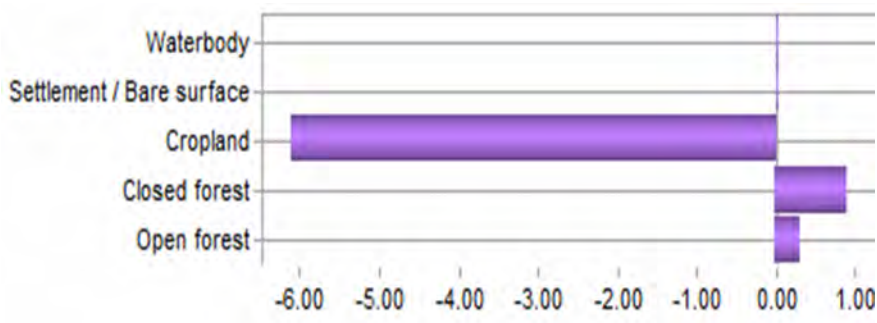

Figure 7.11 *: Contribution to Net change in Settlements/Bare surface between 1990 and 2000 (Pre-mining)*

Source: *Author's construct (2021)*

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Table 7.2: *Overall LULC Transitions between 1990 and 2000 (Pre-mining)*

LULC Transitions	Area (Km2)	Percentage of Change (%)	Transition Rate (%)
Closed forest to Open forest	216.873000	50.1765	5.01765
Cropland to Open forest	60.957000	14.1032	1.41032
Settlement / Bare surface to Open forest	2.019600	0.4673	0.04673
Waterbody to Open forest	0.000900	0.0002	0.00002
Open forest to Closed forest	0.418500	0.0968	0.00968
Cropland to Closed forest	1.287900	0.2980	0.02980
Settlement / Bare surface to Closed forest	0.047700	0.0110	0.00110
Open forest to Cropland	103.279500	23.8951	2.38951
Closed forest to Cropland	33.224400	7.6869	0.76869
Settlement / Bare surface to Cropland	8.454600	1.9561	0.19561
Open forest to Settlement / Bare surface	2.340000	0.5414	0.05414
Closed forest to Settlement / Bare surface	0.959400	0.2220	0.02220
Cropland to Settlement / Bare surface	2.352600	0.5443	0.05443
Waterbody to Settlement / Bare surface	0.002700	0.0006	0.00006
Settlement / Bare surface to Waterbody	0.002700	0.0006	0.00006

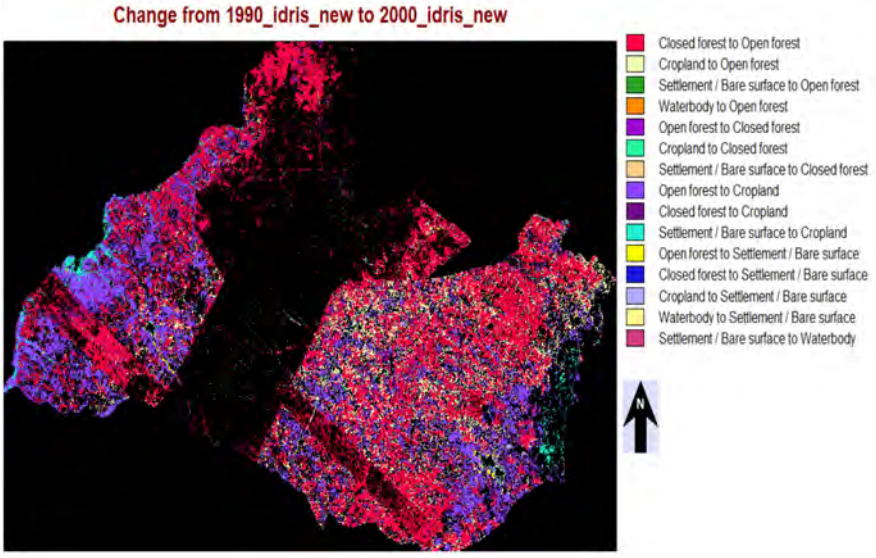

Figure 7.12 *: Spatial Pattern of LULC Transitions between 1990 and 2000 (Pre-Mining)*

Source: *Author's construct (2021)*

7.7 LULC Transitions between 2010 and 2020 (Pre-mining)

A total of twenty transitions in LULC classes in the study between 2010 and 2020 were recorded. These transitions were very prominent within the mining site. This section examines the LULC classes contributing to the changing transitional patterns in each class in the study area in the post-mining period.

7.7.1 Gains and losses in LULC classes between 2010 and 2020 (Post-mining)

An entirely different transitional trend was observed during the post-mining compared to the pre-mining period. The establishment of the mine made significant contributions to the observed transitions in LULC classes in the study area. Anthropogenic activities in the study area contributed to the loss of an estimated 7.3km2 (23.4%) of the closed forest to croplands, open forest, and settlement while it gained 0.4km2 (1.3%) from the same LULC classes. Similarly, an increase in afforestation, the establishment of the mine, settlements construction, and other anthropogenic activities in the study area contributed to an 11.9km2 (37.8%) loss in agricultural lands in the area. Cropland, however,

gained 6.2km2 (19.7%) from the same LULC classes except for open forest. The activities of the mine contributed to a 3.5km2 (11.1%) loss in areas covered by water bodies, croplands, and settlements. However, reclamation activities resulting in the establishment of forests and farmlands, as well as expansion in tailings and environmental control dams due to production increases, contributed to a loss of 7.2km2 (22.9%) of areas covered by the mining site to the closed forest, open forest, croplands, settlements and water bodies. Settlements and waterbodies lost 4.4km2 (14.1%) and 0.6km2 (1.8%) and gained 9.6km2 (30.8%) and 0.7km2 (2.2%), respectively from other land uses during the reference period (Figure 7.13, Table 7.3).

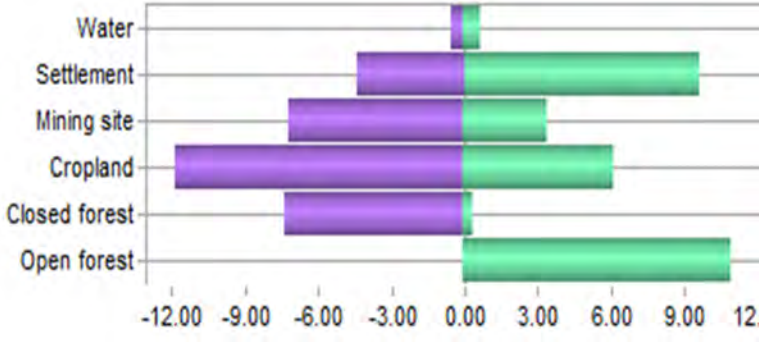

Figure 7.13 *: : Gains and Losses in LULC Classes between 2010 and 2020 (Post-mining)*

Source: *Author's construct (2021)*

7.7.2 Net change in LULC classes between 2010 and 2020 (Post-mining)

The study revealed variations in net changes in LULC classes between 2010 and 2020. While the settlements, open forests, and water bodies experienced a net increase in their area coverage, the mining site cropland and closed forests experienced net reductions in their area coverage. The settlements, open forest and water bodies gained by 5.2km2 (16.7%), 11km2 (35%) and 0.1km2 (0.4%) while the mining site, cropland and closed forest decreased by 3.7km2 (11.8%), 5.7km2 (18.1%), 6.9km2 (11.8%), respectively (Figure 7.14, Table 7.3). This implies that a natural increase in human population, as well as in-migration of mineworkers

into the community, may have driven up the demand for housing resulting in the conversion of other LULC classes into settlements. Also, losses of farmland to the mine appeared to have increasing pressure on forest resources in the area resulting in the degradation of forests. Though mining may have contributed to initial losses in agricultural lands, forests, settlements, etc, reclamation activities within the mining concession contributed to a loss of significant portions of the mine to agriculture and forestry activities in compliance with sustainable mining principles.

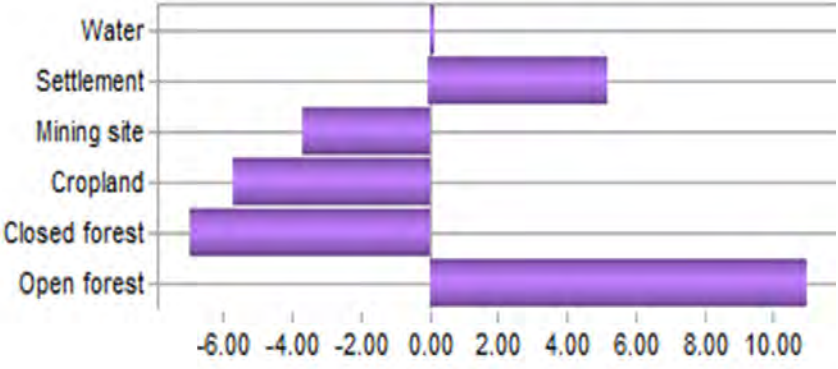

Figure 7.14 *: Net Change in LULC Classes between 2010 and 2020 (Post-mining)*

Source: *Author's construct (2021)*

7.7.3 Contribution to net change in cropland between 2010 and 2020 (Post-mining)

Assessment of the LULC classes contribution to the net change in area covered by cropland revealed that the closed forest, mining site, open forest, settlements, and water bodies collectively contributed a total net loss of 11.9km2 (37.8%) to the area coverage of cropland. The closed forest, mining site, open forest, settlements and water bodies contributing 0.03km2 (0.1%), 2.8km2 (8.9%), 2.6km2 (8.4%), 6.3km2 (20.1%) and 0.1km2 (0.4%), respectively to this loss. Despite these losses, cropland gained 1.0km2 (3.3%), 2.7km2 (8.6 %), 2.3km2 (7.5%) and 0.1km2 (0.3%)

from the closed forest, mining site, settlement and water bodies (Figure 7.15, Table 7.3). However, these gains could not make up for the losses resulting in a net reduction in area coverage of croplands. The results imply that in the post-mining period, the mining site, settlements and open forests are the most significant contributors to the net loss in croplands in the study area. The results also reveal the loss of croplands with the establishment of the mine and increase in human settlement, resulting in a net negative impact on the closed forest.

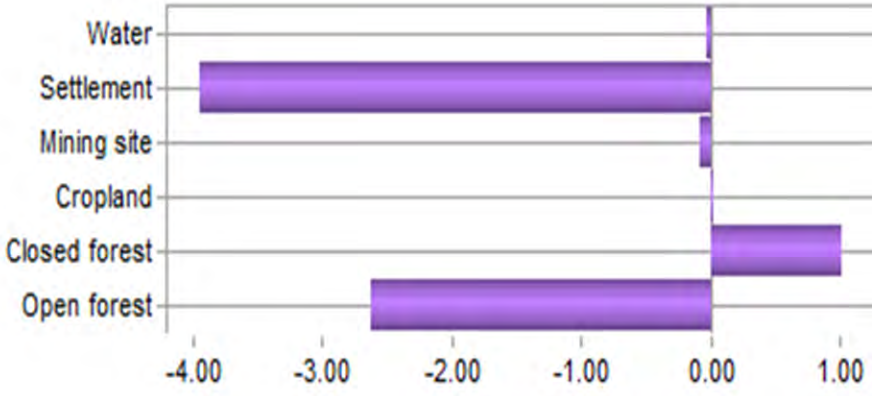

Figure 7.15 *: Contribution to Net change in Cropland between 2010 and 2020 (Post-mining)*

Source: *Author's construct (2021)*

7.7.4 Contribution to net change in mining site between 2010 and 2020 (Post-mining)

Between 2010 and 2020, the mining site experienced many transitions with the other LULC classes resulting in net changes in the mining site. These transitions resulted in a total estimated loss of 7.2km2 (22.9%) and a gain of 3.5km2 (11.1%) to the other LULC classes. The mining site, therefore, experienced a net negative transition as the gain experienced from the other LULC classes could not make up for the losses. LULC classes which contributed to the loss of the mining site include closed forest 0.0045km2 (0.01%), cropland 2.7km2 (8.6%), open forest 0.7km2 (2.35%), settlements 3.2km2 (10.1%) and water bodies 0.6km2 (1.9%); while

croplands 2.8km2 (8.9%), settlements 0.2km2 (0.7%) and water bodies 0.4km2 (1.4%) contributed to a net gain to the mining site (Figure 7.16, Table 7.3). This implies that, though the establishment of the mine resulted in the conversion of areas covered by farmlands, settlements, forest, and water bodies, interventions in the mining operations such as reclamation of mined areas into forests and farmlands has resulted in a gradual reduction in degraded areas within the mining concession. It is also evident from the results that the expansion of settlements, tailings, and environmental control dams, and establishment of plantations were the major contributing factors to the net losses in the mining site while the mining site largely gained by the conversion of farmland into mining areas

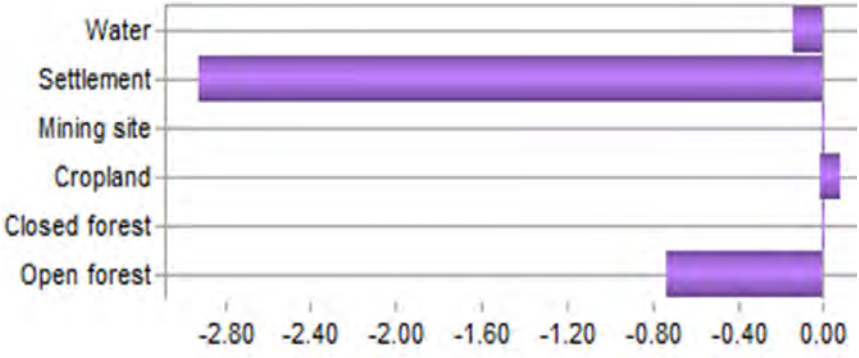

Figure 7.16 *: Contribution to Net change in Mining Site between 2010 and 2020 (Post-mining)*

Source: *Author's construct (2021)*

7.7.5 Contribution to net change in open forest between 2010 and 2020 (Post-mining)

Contrary to other LULC classes which lost and gained from the other LULC classes between 2010 and 2020, the open forest largely gained from the other LULC classes without any losses. Collectively, the LULC classes contributed to a net gain of 11km2 (35%) to the open forest class with the closed forest, croplands, mining site, and settlements contributing 6.1km2 (19.6%), 2.6km2 (8.4%), 0.7km2 (2.4%) and 1.5km2 (4.7%), respectively to this gain (Figure 7.17, Table 7.3). It is evident from the results that the LULC classes largely impacted by the expansion of open forests during the reference period are closed forests and croplands which indicates some degree of degradation in the study area. It is, however, interesting to note that areas within the mining site that may have been converted into open forest may be growing forest established as a result of the reclamation activities of the mine.

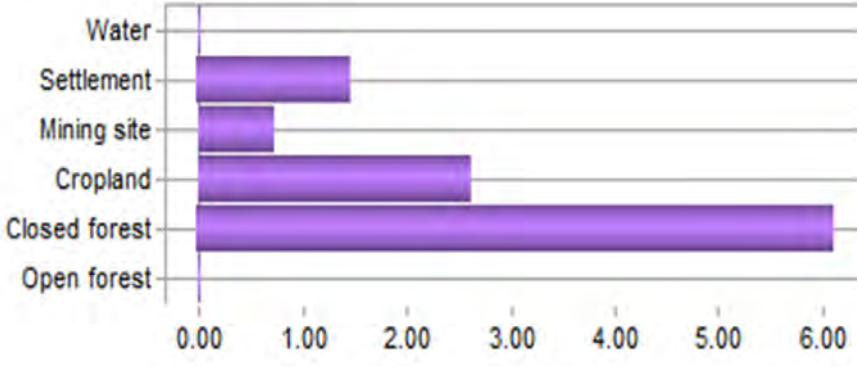

Figure 7.17 *: Contribution to Net change in Open Forest between 2010 and 2020 (Post-mining)*

Source: *Author's construct (2021)*

7.7.6 Contribution to net change in closed forest between 2010 and 2020 (Post-mining)

Changes in the closed forest cover of the study area in the post-mining period were largely experienced through transitions between the closed forest and LULC classes such as croplands, open forests, settlements, and the mining site. Collectively the croplands, open forest and settlements contributed to 7.3km2 (23.4%) loss in closed forest covererage, with individual contributions of 1km2 (3.3%), 6.1km2 (19.6%) and 0.2km2 (0.5%), respectively to this loss. Closed forest, however, gained 0.4km2 (1.3%) from the other LULC classes with cropland, mining site, and settlements contributing 0.03km2 (0.1%), 0.0045km2 (0.01%) and 0.4km2 (1.1%) to this gain (Figure 7.18, Table 7.3). However, the gain from these LULC classes could not make up for the losses, resulting in a net reduction in area covered by closed forest during the reference period. The high rate of open forest transition into the closed forest indicates a high rate of forest degradation in the study area due to increases in human activities. Also, the transition of croplands into the closed forest indicates when developmental activities in agrarian communities result in the conversion of agricultural lands into other land uses, the land use that compensates for such losses are forested areas.

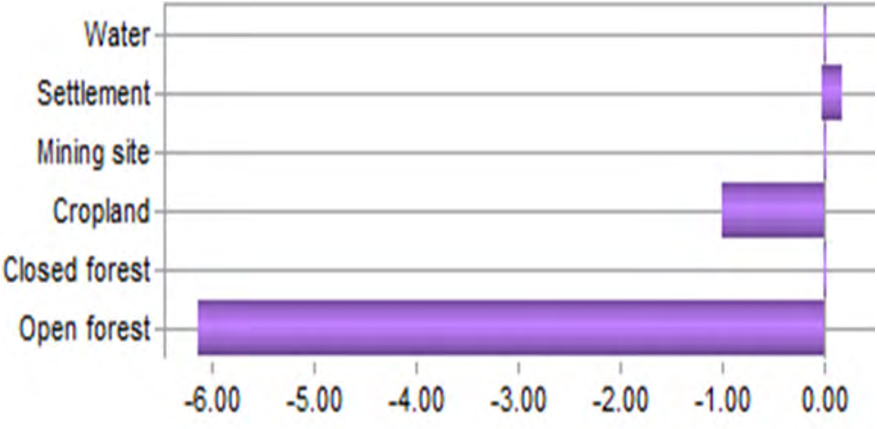

Figure 7.18 *: Contribution to Net change in Closed Forest between 2010 and 2020 (Post-mining)*

Source: *Author's construct (2021)*

7.7.7 Contribution to net change in water bodies between 2010 and 2020 (Post-mining)

Transitions in area covered by water bodies in the study area largely happened through interactions with settlements, mining site, and croplands. Interactions with these LULC classes contributed to a collective loss of an estimated 0.6km2 (1.8%) of area covered by water bodies to croplands 0.08km2 (0.3%), mining site 0.4km2 (1.4%) and settlements 0.03km2 (0.1%). However, the water bodies also made significant gains from areas previously covered by croplands 0.1km2 (0.4%) and the mining site 0.6km2 (1.7%), through the establishment of fishponds and expansion of the tailings and environmental control dams due to production increases (Figure 7.19, Table 7.3). These resulted in a net increase in area covered by water bodies.

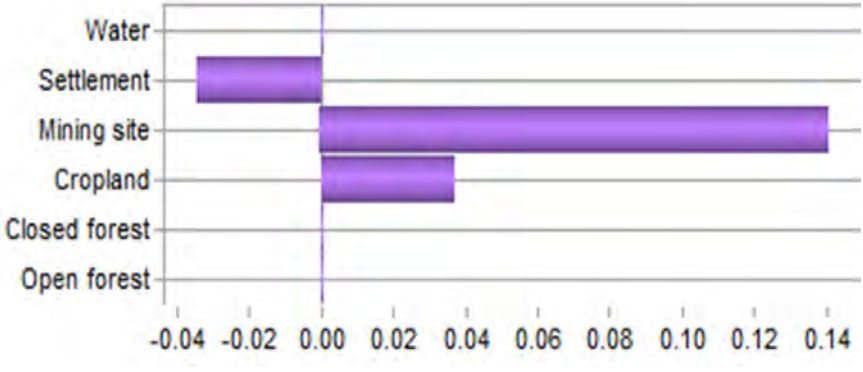

Figure 7.19: *Contribution to Net change in Water Bodies between 2010 and 2020 (Post-mining)*

Source: *Author's construct (2021)*

7.7.8 Contribution to net change in settlement/ bare land between 2010 and 2020 (Post-mining)

Settlements collectively lost an estimated 4.4km2 (14.1%) of their area covered to the other LULC classes between 2010 and 2020. Agricultural lands were the highest contributor to this loss 2.3km2 (7.5%) followed by open forests 1.5km2 (4.7%), closed forest 0.4km2 (1.1%) and the mining site 0.2km2 (0.7%). However, similar to the other LULC classes, settlements collectively gained 9.6km2 (30.8%) from closed forests 0.2km2

(0.5%), croplands 6.3km2 (20.1%), mining site 3.2km2 (10.1%) and water bodies 0.03km2 (0.1%) (Figure 7.20, Table 7.3). This result suggests that when there is an increase in human population resulting in high demand for housing and an increase in the value of land, the LULC class that is negatively impacted is agricultural lands due to their ease of conversion compared to other LULC classes. The results also reveal an expansion in settlements/developmental activities within the mining concession.

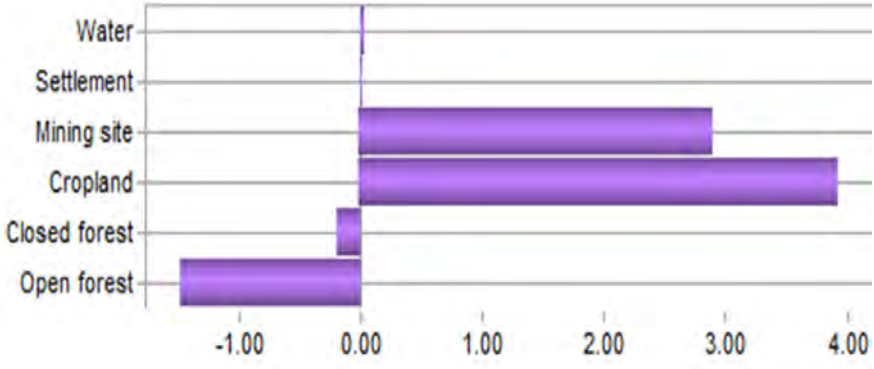

Figure 7.20: *Contribution to Net change in settlement/Bare Land between 2010 and 2020 (Post-mining)*

Source: *Author's construct (2021)*

Table 7.3: *LULC Transitions between 2010 and 2020 (Post-mining)*

LULC Transitions	Square kilometers	Percentage of Change (%)	Transition Rate (%)
Closed forest to Open forest	6.128100	19.55991	1.955991
Cropland to Open forest	2.619900	8.362299	0.83623
Mining site to Open forest	0.737100	2.352705	0.23527
Settlement to Open forest	1.478700	4.719772	0.471977
Cropland to Closed forest	0.034200	0.109161	0.010916
Mining site to Closed forest	0.004500	0.014363	0.001436
Settlement to Closed forest	0.356400	1.137571	0.113757
Closed forest to Cropland	1.045800	3.338025	0.333803
Mining site to Cropland	2.706300	8.638074	0.863807
Settlement to Cropland	2.341800	7.474649	0.747465
Water to Cropland	0.079200	0.252794	0.025279
Cropland to Mining site	2.795400	8.922467	0.892247
Settlement to Mining site	0.231300	0.738272	0.073827
Water to Mining site	0.439200	1.401856	0.140186
Closed forest to Settlement	0.165600	0.528569	0.052857
Cropland to Settlement	6.284700	20.05975	2.005975
Mining site to Settlement	3.150900	10.05717	1.005717
Water to Settlement	0.034200	0.109161	0.010916
Cropland to Water	0.116100	0.370573	0.037057
Mining site to Water	0.580500	1.852863	0.185286

Source: *Summarised from Field Data (2021)*

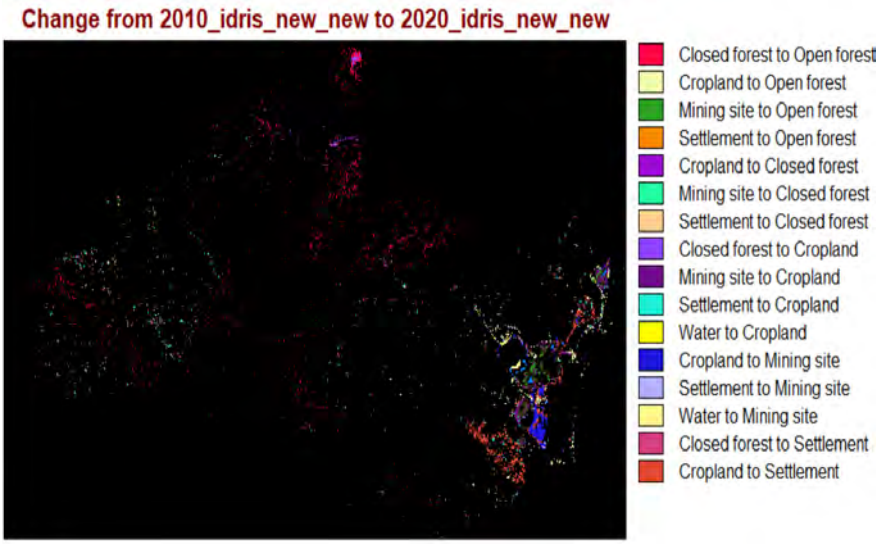

***Figure 7.21**: Spatial Pattern of LULC Transitions between 2010 and 2020 (Post-Mining)*

***Source:** Author's construct (2021)*

7.8 Chapter Summary

While there have been significant transitions in the different LULC types examined, the evidence suggests that the LULC types have remained fairly stable. Mining has had an insignificant impact on LULC classes studied. A situation attributable to the sustainable practices put in place by Newmont Goldcorp. Indeed while closed forest decreased during the pre-mining era by a significant 32.8%, it recorded a net gain during the mining era by some 71km2 which underscores the strong environmental sustainability drive of Newmont. It therefore comes as no surprise to learn that Newmont Goldcorp has been adjudged the most environmental sustainable mining operation in Ghana over the last six years.

Chapter 8
SUMMARY OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

8.1 Introduction

This study set out to understand the extent to which resource extraction impacts the development of mine-take communities either positively or negatively. To do so a case study of one of Ghana's popular mining districts was selected. Although, the management of the mine did not respond to our request, and subsequent reminders to allow us to interview their monitoring and evaluation officers and executives of the Newmont Ahafo Development Foundation, efforts were made to incorporate their perspectives into the study through available secondary data. This section of the report summarises the findings from the study to draw a conclusion and make recommendations for policy.

8.2 Summary of Findings

Following the analysis of the empirical data, the major findings discernible from this case study are summarized as follows:

- The study area had characteristics typical of many Ghanaian communities. The participants comprised mostly of married people, with average household size of five (5). The population is also largely youthful with significant implications for job creation.

- The demographics also show that more than 65 percent of the study participants had educational attainments beyond the basic level. Meanwhile nearly 90 percent of them work in the informal sector as drivers, artisans, traders among others. Unemployment rate is also very low.

- Income levels in the mine-take communities have also seen some appreciable increases over the years, particularly as it relates to the pre- and post-mining eras. While individuals who earned less than GH¢500 per month saw a 20 percent reduction since the establishment of the mine, those who earned between GH¢1,001 – 1,500 saw a marginal appreciation of about 1 percent in the post-mine era. However, incomes are generally earned from non-mine related activities. Notwithstanding, the role of the mine in the growth of the micro-economy

Wamahinso DA basic School- a NADeF project
source: facebook.com (NADeF)

of the district and its trickle down effects cannot be overlooked.

• The revenues of the Asutifi North District Assembly has also experienced significant leaps since the inception of the mine. This increase in internally generated revenues is driven by mineral royalties, directly, on the one hand, and businesses that have set up in the district to take advantage of the presence of the mine. Revenues from mineral royalties grew from GH¢1,125,212.76 to GH¢4,773,353.35 from 2010 to 2020. This should provide the district assembly with the leverage in resources to invest in interventions that improve the socio-economic wellbeing of the inhabitants.

• Newmont has established the Newmont Ahafo Development Foundation, which serves as the main vehicle for its interventions in the mine-take communities. The evidence show that the Foundation has partnered various stakeholders and invested significantly on various sustainable development interventions within the mine-take communities. Community members indicated that they appreciate the interventions of the Foundation.

• Even though mining is on-going in a brisk manner, agricultural outputs are also doing fairly well. However, agriculture is still largely rain-fed and outputs plummet in years with unfavourable weather conditions.

- Local inhabitants of the mine-take communities indicated that they have difficulties securing job opportunities with Newmont. This is not surprising, however, as mining companies often require employees with high levels of skills and competencies which many local community members may not readily possess.

- Access to land, particularly for agriculture has not been affected by the mining operations. Individual community members who are natives of the mine-take communities are still able to access family lands for agricultural purposes. Sharecropping arrangements between natives and non-natives are also still pervasive. However, population growth, growing land values and increasing pressure on land resources are likely to affect access to land by various individuals for agriculture, sooner or later.

- The evidence points to the fact that Newmont affords the members of the mine-take communities the opportunity to participate in decisions affecting them. There is therefore voice and accountability within the area.

- People are generally aware that the communities receive royalties from the operations of Newmont. They also indicate that the dividends from the royalties are visible to all in the form of infrastructure and scholarships to deserving members of their communities. However, they had concerns over decisions on the use of royalties are made. They aver that chiefs control the use of the royalties and there is little transparency in that respect.

- There are fears of the long-term impacts of the mining operations on the health of the inhabitants. Blasting is said to leave cracks on buildings and issues of dust pollution, acid rain and water pollution are also of concern to inhabitants of the mine-take communities.

- The mining operations have not had any significant adverse environmental effects, based largely on land use land cover analysis undertaken. While closed forest declined from 1990 – 2000, a pre-mining era, it increased between 2010 – 2020, a post-mining era. This is attributed to afforestation programmes introduced by the local authority and Newmont, as well as reclamation of mined areas.

8.3 Outcome of Stakeholder Validation Workshop

The validation workshop brought to the fore a number of issues that either corroborated or otherwise the findings of the study. There was a general consensus that the study was detailed and well conducted. Some of the issues raised at the workshop include:

1. The claim that food production was on the ascendancy cannot be accurate as food sufficiency is a major issue in the district (A SDC member). This claim was refuted by the District Director of Agriculture who indicated that while food production in the mine-take communities may have declined, the situation in the district is not the same. The District Director of Agriculture therefore confirmed the finding of the study that agricultural outputs have been on the ascendancy over the years.

2. Transparency in the use of royalties was a thorny issue. Representatives from the traditional authorities maintained that royalties paid to them are meant for the maintenance of their stools. Participants were therefore of the view that the District Assembly initiates measures to showcase its use of mineral royalties and improve transparency in that respect.

3. The communities had been engaging with Newmont for a review of the $1 per ounce of gold sold which is set aside for NADeF activities. This in their view will take care of inflationary and currency depreciation over the years (CSO member). It was contended that Newmont is unwilling to review the rate. The research team, however, pointed out to the participants that the dollar was one of the most stable currencies and therefore unlikely to be affected by inflation and currency depreciation.

4. Issues of youth unemployment and equality of access to jobs in the mine, acid rain, health and safety and increasing teenage pregnancies and other social ills were also reported. These remain contested issues as the study also made similar findings.

5. Land access was also seen as a major issue as people claimed they had lost their lands to the mine. Even though many of such

people had been resettled, they now contend that they have lost the main source of their livelihoods, i.e., their lands to the operations of the mine. Incidentally, NADeF is running several skills enhancement and job creation interventions and it will be important for these class of individuals to be given priority in NADeF's interventions. This will help equip them with alternative livelihood skills in the areas of fish farming, piggery, poultry and guinea fowl farming.

8.4 Conclusions

The study shows that the extractive sector can become a worthy partner for development if the right policies and programmes are put in place. Even though community members have concerns, there is some optimism that the interventions being put in place by Newmont will have long-term beneficial impacts on the communities. The Ahafo area is on the right track to achieving sustainable development if the relationships between Newmont and the "mine-take" communities in the Ahafo area is sustained and further deepened. So far, it appears that the ingredients are in place to improve the human resources of the communities, empower local economy, provide job opportunities, as well as conserve national and cultural resources. However, the emerging challenges need to be seriously examined and dealt with, so that the interventions being put in place can be inter-generationally beneficial.

8.5 Recommendations

While the findings show that the various stakeholders are on the right track the following still require attention:

- There is the need to find alternative ways of ensuring transparency and accountability in the use of mineral resources. Otherwise this has the potential of creating a 'rentier' sort of system in the traditional chieftaincy institution. Mineral royalties belong to the people and not the chiefs and should therefore be used to improve the welfare of the inhabitants of the mine-take communities. As such there should well established systems for the decision making regarding the use of such royalties.

- The government of Ghana can ensure the replication of the Newmont model in all mining communities across the country. This can be done through the revision of mining leases and the requirement that every mining firm establishes a development foundation that directly supports the development interventions in communities within their catchment.

- The growth in revenues of the Asutifi District Assembly should be accompanied with commensurate increases in qualitative development interventions. The evidence shows that people appear to be looking up to Newmont rather than the local government which has the responsibility for the development of the area.

- Local community members in mining communities need to be sensitised to appreciate that opportunities in the mining sector are few. They can however, take advantage of the conducive business environment created by the presence of mining companies to pursue other beneficial individual and group interests.

- It is important for the stakeholders in the Ahafo area and other mining communities to ensure that the traditional occupation of the people is bolstered to overcome shocks. In the case of Ahafo for instance, it should be possible to invest strategically to ensure that agriculture, the mainstay of the local economy, is not rain fed. This can be done through the construction of mini-dams in the mine-take communities to support all year round agriculture.

- Finally, it is important for government to continue to pursue interventions to stabilise the economy. Generally, inflation and price volatilities affect the purchasing power of all categories of people, irrespective of the fact that incomes may be doing well. Stabilising the macro-economy will therefore have long-term benefits for all.

- Mining communities remain under-developed just like many Ghanaian communities. Government may need to set up a special purpose vehicle geared towards the development of resource-rich communities in the country. This could take the form of increased

budgetary allocation or setting aside 1-3 percent of annual government earnings to specific interventions in resource-rich communities as a way of improving general living conditions in those areas.

- Obviously, many individuals who were beneficiaries of compensation packages, misused the resources and turned around to blame Newmont for paying them meagre compensation packages. It is recommended that Government intervenes in the compensation management processes by ensuring that individual beneficiaries of compensation are often equipped with skills and competencies to manage the large amount of resources that is often put at their disposal.

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ANNEXES

Annex A: Household Questionnaire
PROJECT TITLE: RESOURCE EXTRACTION AND THE SUSTAINABLE DEVELOPMENT OF MINE-TAKE COMMUNITIES

Part I: Reference Information

Date of Administration			
Name of Interviewer			
Gender of respondent			
Phone No of respondent			
Community ID Number			
Household Number			
Number of People in the Household			
Results of Exercise (Tick as Appropriate) •Incomplete (to be continued on an agreed date) ☐ •Incomplete (Refused to continue with exercise) ☐ •Incomplete (Other, specify……) ☐ •Complete ☐			

Part II: Socio-Demographic Data

No.	Variables	Response
1.	Age of respondent	
2.	Educational attainment	
3.	Occupation •primary •secondary	
4.	Marital status	
5.	Number of Children (if married)	
6.	Religion	
7.	Ethnicity	
8.	Membership of Community	a) native b) migrant (specify place of origin) c) other (specify……

Part II: Socio-Demographic Data

No.	Variables	Response
9	Average monthly income (GH¢) (Before mine establishment)	a) less than 500 b) 501 – 1000 c) 1001 – 1500 d) 1501 – 2000 e) 2001 – 2500 f) 2500+
10	Average monthly income (GH¢) (After mine establishment)	a) less than 500 b) 501 – 1000 c) 1001 – 1500 d) 1501 – 2000 e) 2001 – 2500 f) 2500+
11	Sources of income (Before mine establishment)	a) Employment directly related to the mine b) Employment indirectly related to the mine c) Non-mine related employment

12	Sources of income (After mine establishment)	a) Employment directly related to the mine b) Employment indirectly related to the mine c) Non-mine related employment
13	How stable has your income been over the years?	a) Very stable b) Stable c) Unsure d) Unstable e) Very unstable
14	Provide reasons for your response to Q13.	
15	Has the presence of the mine got any influence the stability your income?	a) Yes b) No
16	Give reasons for your response to Q15.	
17	How much were you spending on the following items monthly? (Before mine establishment) a) Food b) Electricity c) Water d) Clothing e) Education f) Health g) Communication h) Rent i) Transportation	
18	How stable has your expenditure been over the years?	a) Very stable b) Stable c) Unsure d) Unstable e) Very unstable

19	Provide reasons for your response to Q18	
20	Has the presence of the mine got any influence the stability your expenditure?	a) Yes b) No
21	Give reasons for your response to Q20.	
22	How much do you spend on the following items monthly now? **(After mine establishment)** a) Food b) Electricity c) Water d) Clothing e) Education f) Health g) Communication h) Rent i) Transportation	
23	Is food available and affordable all year round?	a) Yes, always b) Depends of the season c) Fluctuates between years d) No
24	Provide reasons for your answer to Q23.	
25	Has the presence of the mine got any influence the availability of food all year round?	a) Yes b) No
26	What reasons account for your answer to Q25?	
27	How likely are you or your relatives to get employed by the mining company compared to other locals?	a) Very likely b) Likely c) Not sure d) Unlikely e)Very unlikely
28	Provide reasons for your answer to Q27.	

****Collect data on district revenue for the past 5 – 10 years, price volatility for the past 5 – 10 years, and agricultural outputs for the past 5 – 10 years from the District Assembly, District Statistical Service and District Directorate of Agriculture, respectively.*

Part IV: Social Sustainability

29	How is land accessed for agricultural activities by the locals?	a) Family inheritance b) Grants c) Sharecropping d) Share cropping
30	Is this different from how it was like before the advent of mining?	a) Yes b) No
31	If yes to Q30, kindly provide reasons for the change.	a) Yes b) No
32	Does the mining company provide the community with any important information relating to its activities?	a) Yes b) No
33	If yes to Q32, have you ever participated in any of those information sessions	a) Employment opportunities b) Compensation c) Blasting d) Pit closure e) Health and safety f) Others (specify……
34	What kinds of information is often provided?	
35	How often does the mining company engage the communities on these issues?	a) Monthly b) Quarterly c) Yearly d) As and when necessary e) Others (specify……

36	Who can participate in information sessions organised by the mining company?	a) Everybody b) Adult male only c) Adult females only d) Youth groups only e) Chiefs and opinion leaders only f) Depends on the purpose of the forum g) Others (specify……
37	Does the mining company pay royalties to the communities?	a) Yes b) No c) I have no idea
38	If yes to Q37, how often are payments made?	a) Quarterly b) Annually c) Others (specify……
39	How are the mining royalties paid to the community used?	a) To build infrastructure b) To provide scholarships c) To create alternative jobs d) Others (specify……
40	Who controls the use of mining royalties?	a) Chiefs b) Assembly members c) Elected community members d) Others (specify……
41	Have you ever participated in a process to determine the use of royalties?	a) Yes b) No
42	If yes to Q41, what was the outcome of the meeting?	a) Yes b) No
43	Is the use of mining royalties transparent and sustainable?	
44	Provide reasons for your answer to Q43	

******collect secondary data from the mining company and the Newmont Ahafo Development Foundation where possible.***

Part VI: Part VI: Vulnerability, Adaptation and Sustainability

45. What dangers do the mining operations expose the community to?

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46. What measures are being put in place to mitigate or avoid these dangers?

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47. How can the mine better support the community to develop sustainably?

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THANK YOU FOR YOUR TIME.

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