Ros UNIVERSITY OF CAPE COAST

HUMAN SECURITY IMPLICATIONS OF ILLEGAL MINING ON COMMUNITIES SURROUNDING ATIWA FOREST, GHANA

BY

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this University or elsewhere.

Candidate's Signature…… Date: …….

Name: Robert Laryea Okorley

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of the thesis laid down by the University of Cape Coast.

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ABSTRACT

While mining has been proven to contribute significantly to economic development of nations, including Ghana, illegal mining has been a serious problem affecting people. In recent times, illegal miners have been reported to operate in the Atiwa Forest, with concomitant human security implications. The present study, therefore, relied on the human security and resource curse theories as well as Maslow's theory of needs to qualitatively examine the human security implications of illegal mining activities in the Atiwa Forest. The study relied on interviews of 31 respondents involving illegal miners, traders, farmers, family heads, royals of three communities around the Atiwa Forest as well as members of Forestry the Commission, District Assembly, Divisional Police, Community Mining Taskforce, District Police, and Mineral Commission. The study revealed that the illegal mining activities have affected the main sources of water in the communities, as well as people's food security, personal security, and health security. In addition, the study found that conflicts occur among the miners, miners and regulatory bodies, and miners and the communities. It was also found that regulatory institutions employed prosecution of illegal miners, education, and collaborative forest management as means of fighting illegal mining in the study area, which are partly effective. The study also revealed that the people use a number of coping strategies to offset the impact of illegal mining activities on their lives. It is recommended that job creation in the study area, sensitization of people on the negative consequences of illegal mining, and law enforcement should be given serious consideration in order to see to the end of illegal mining in the Atiwa Forest.

KEYWORDS

Atiwa Forest

Coping Strategies

Human Security

Illegal Mining

Regulatory Mechanisms

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DEDICATION

To my parents, Benjamin Adjei Laryea and Susuana Anyema Abam.

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CHAPTER ONE

INTRODUCTION

Background to the Study

All over the world, mineral wealth is considered critical to the socio-economic development of nations. Because of this, mining plays a significant role in many countries (Aboka, Cobbina, & Doke, 2018). Mining normally comes in two forms: small-scale mining and large-scale mining. The former involves rudimentary, manual extraction of minerals, with serious negative implications to human health. In developing countries like Ghana, it is considered to be motivated by the endemic poverty and its associated harsh socio-economic conditions (Hilson et al., 2021). Many people depend on small-scale mining for their living. The number of workers in this industry climbed from 30 million in 2014 to 40.5 million in 2017 (IGF, 2017). Most individual miners globally extract and refine priceless stones and minerals (such as gold, diamonds, and bauxite) (Abdurashidovich, 2020).

In almost all of emerging nations, small-scale mining has been experiencing rapid growth, especially in remote locations. Most miners in these remote places do not have the appropriate instruction, schooling, managerial skills, and machinery for mining. Most of such miners were forced into engaging in the mining activities because of poverty and unemployment (Musah-Surugu et al., 2017). The development in the mining industry in sub-Saharan Africa has been made possible by the inflow of foreign capital in addition to the rise in the

value of gold on the global marketplace, which is the primary substance generated by small-scale mining (Hilson, 2019).

One of the many sub-Saharan African nations with an extensive tradition of small-scale mining is Ghana. Small-scale mining first began in Ghana in the colonial era when sedimentary gold and diamond exploitation were the primary mining-related activity. It was the association between Ghana and alluvial gold that gave the country the name, "Gold Coast". Most small-scale miners in Ghana have operated lacking a mining permit over the years. As a result, some of the money made by small-scale mining operations is wasted due to the export of the minerals illegally. As a result, Ghana generally views small-scale mining as an unlawful enterprise (Boadi et al., 2016).

Ghana's small-scale mining industry has grown significantly recently. It has mostly concentrated on the extraction of diamonds and gold. More than 30% of the nation's gold is produced there, and it continues to be the only source of diamonds in the country. In addition to providing raw materials for the neighborhood goldsmiths, it sustains the local economy, creating jobs, especially in rural areas. According to Bansah (2023), more than a million individuals are thought to be directly employed in legally permitted small-scale mining. Semi-skilled workers and jobless university graduates are among those involved in small-scale mining (Arthur-Holmes & Busia, 2020).

In 1989, the government of Ghana passed the People National Defence Council (PNDC) Law (218), the Small-Scale Gold Mining Law to legalize small-scale mining in the country. Considering the prospective expansion of the nation's

small-scale mining industry, this became essential. The Mineral Commission is required by this statute to authorize and monitor all small-scale miners in the nation (Asamoah et al., 2017), causing a rise in small-scale mineral extraction, both legally and illegally (Akudugu, Mahama, & Atami, 2013). A further increase in illegal mining has resulted from the Structural Adjustment Program in the 1980s which have led to the layoff of employees in the public sector. Thus, people who lost their jobs through the structural adjustment programs, as well as marginalized farmers resorted to illegal mining, popularly known as *galamsey*, as a form of livelihood (Antwi-Boateng & Akudugu, 2020).

In Ghana, *galamsey* is considered a serious problem that needs the implementation of a 'lasting solution' (Eduful et al., 2020). *Galamsey* operators, for instance, are thought of as outlaws and careless destroyers of potable water and other ecosystems (Mantey et al., 2020). *Galamsey* has also drawn attention due to its operations in authorized regions like game reserves, forest reserves, or places close to water supplies (Boadi et al., 2016).

Illegal mining has serious human security implications. A component of security is the reduction of vulnerabilities to established values, especially those that are thought to be urgent and necessary. Human security is one such threat (Williams, 2012). Human security advocates claim that security must prioritize the person as the primary benefactor rather than the state. Human security has four fundamental characteristics including; universality, relatedness of components, prevention-focused, and people-centred (Newman, 2010).

From the foregoing, human security can be further divided into concepts that are specific and general. Most simplified interpretations are expressed as being free from the fear of political violence while a broader perspective adds freedom from want. Because there is a risk of political violence, both the fundamental needs of individuals and more general conceptions of insecurity are endangered. The lack of safeguards for people's financial and ecological demands and ambitions, on the other hand, may lead to people turning to violence in protests. The present research adopts the general perspective and emphasizes the welfare of people (Hampson, 2013).

In Ghana, the impact of illegal mining on human security has been evident in many ways. Basu et al.'s (2015) study discovered that there were comparatively substantial risks to hearing damage and connected this to the rise in emotional, nutritional, sex-related, cardiovascular, and respiratory conditions in Ghana. It also linked them to challenges with water and sanitation. Similarly, Schueler, Kuemmerle, and Schröder (2011) revealed farmland losses and deforestation as key challenges imposed by the activities of illegal mining. The study also showed that on-site gold extraction led to ecological destruction (such as contamination of surface water and natural beauty loss).

This study highlights the implications of mining activities on economic security and environmental security. In terms of economic security threat, people losing their farm lands means they may not be able to cultivate on that land. The implication is that they lose their means of livelihood, which affects their economic security. On the other hand, loss of ecosystem services as well as land

degradation that result from mining, as highlighted in this study, underscores the environmental human security effects of illegal mining. Therefore, the core argument of this study is that illegal mining poses human security threat to the residents of communities surrounding the Atiwa Forest which infringed on the fundamental human right of the right to live on the natives of these communities. This argument is underpinned by Human security theory, Resource curse theory and Maslow's theory.

According to research by Boateng, Codjoe, and Ofori (2014), in the Atiwa District, mining activities negatively affected cocoa farms close to mining sites. Additionally, Snapir et al. (2017) discovered that the *galamsey* population more than tripled between 2011 and 2015, directly encroaching on the Apamprama and Atiwa designated forest areas by 603 hectares. The study also discovered that *galamsey* resulted in downstream pollution that affects both land and water.

Atiwa Forest Reserve, has had problems as a consequence of unlawful mining (Kusimi, 2015). Established in 1926, the 17,400-hectare Atiwa Forest is a significant natural wooded area. The semi-humid and semi-arid semi-equatorial transitional zones are where the Atiwa Forest is situated. The larger northern area of the Atiwa Forest is located in the wet transition zone, which is characterized by humid conditions and a precipitation regime that is twice as high. The typical annual rainfall is between 1200 and 1600 mm, and the average monthly temperature is between 24 and 29 degrees Celsius. The Densu, Ayensu, and Birim rivers all have their beginnings in the forest, which is a significant watershed. For rural villages in addition to a number of Ghana's main urban

centres, including Accra, these rivers constitute the most significant suppliers of residential, farming, and commercial water.

In addition to being acknowledged as a watershed, the Atiwa Forest Reserve is home to Ghana's richest and most pristine montane coniferous forest (Ayivor & Gordon, 2012). Communities like Kwabeng, Anyinam, Bomaa, Akrofufu, Kibi, Adadetem, Ankwadum, and Ankaase are located around the forest. Community rights were nevertheless granted to residents of surrounding communities despite the fact the Atiwa forest was classified as a conservation area in 1926.

The customs and traditions of the communities that straddle the forest's edge and the Atiwa reserve are intimately linked. The deceased relatives of the Akyem Abuakwa people, who provide security, fulfilment, and growth, are said to reside in the woodlands. Particular creatures may serve as the symbols for certain clans. The forest serves as a source of non-timber products for nearby communities as well as a source of several water bodies like the Densu, Ayensu, and Birim.

Statement of the Problem

In Ghana, concerns have been raised about the extensive damage illegal mining activities have caused to forest reserves (Boadi et al., 2016). The majority of the country's accessible rainforests are being lost as a result of a variety of urbanization projects alongside mining, logging, agriculture, and wildfires (Hansen, Lund, & Treue, 2009). As indicated by the Ministry of Lands and

Natural Resources (2012), Ghana has a 2.0% deforestation rate, which results in a yearly destruction of about 135.000 hectares of forest.

The illegal gold mining is one hazard and challenge to the preservation of this forest reserve. One of Ghana's three bauxite mining sites is located in the forest, and gold is extracted from the reserve's edge (Purwins, 2022). Residents have been impacted by these illegal mining operations in many different ways, such as early falling of premature cocoa pods, dying, browning of the foliage, and low yields (Boateng, Codjoe, & Ofori, 2014), consequences for the wellness of the population in mining areas, which lowers agricultural productivity, as well as effects on left pits becoming places for mosquitoes to breed and death traps, which raises the rate of malaria (Ocansey, 2013).

As in countries like South Africa, illegal mining also rekindles issues of fear of death in miners themselves as well as residents of surrounding communities (Stewart, Bezuidenhout, & Bischoff, 2020). In particular, farmers are reported to fear falling into mining pits and dying, and this has resulted in them abandoning their farming activities (Debrah & Asante, 2019). These problems raise questions about what coping strategies are adopted by residents of these mining communities to mitigate the impact of illegal mining on their human security.

Another issue is the existence of conflicts in the area, as reported by Purwins (2020). According to Purwins, the major actors in the conflict include the chiefs, community members, non-governmental organisations, the government, and illegal miners. A youth anti-bauxite mining protest march around the Atiwa

forest attracted notice in the early 2020. Following the protest march, numerous chiefs banded together and issued a statement opposing the demonstration. The government, the youth, and certain chiefs from the affected areas will now be at odds with one another as they attempt to delegitimise the protests.

Efforts have been made to stop this illegal mining. In 2017, the Operation Vanguard, for instance, was launched against *galamsey*. However, the effectiveness of such interventions depends on a clear understanding of the dynamics of the *galamsey* issue, and this highlights the need for research into *galamsey* especially in forest reserves in Ghana. Previous research on Ghanaian illegal mining (Banchirigah, 2008; Hilson, Amankwah, & Ofori-Sarpong, 2013) has revealed how mining activities have led to poor health outcomes, environmental degradation, water pollution, etc. in mining areas. However, majority of such studies concentrated on other areas and not forest reserves, especially the Atiwa Forest, which is the subject of the present study. The few exceptions include Baako et al.'s (2018). These studies do give credence to the human security of communities along the illegal mining sites. Clearly, this knowledge is missing in the extant literature and has created empirical gap in the bodies of knowledge to be explored. As a result, this study sought to examine the human security implications of illegal mining on residents of communities around the Atiwa forest.

Objectives of the Study

The general objective of this study was to examine the implications of illegal mining on human security of residents in communities surrounding the Atiwa Forest.

Specifically, the study sought to:

1. Assess the implications of illegal mining activities on the livelihoods of people around the Atiwa Forest;
2. Examine the conflicts that arise out of the activities of illegal mining.
3. Assess the capacity of regulatory institutions to control illegal mining on the surrounding communities;
4. Examine the coping strategies community members adopt to cope illegal mining activities;
5. Recommend policy interventions needed to address the problem of illegal mining in the Atiwa Forest Reserve.

Research Questions

1. How have the activities of illegal mining affected the livelihoods of people around the Atiwa Forest?
2. What are the conflicts that arise out of the activities of illegal mining?
3. What is the capacity of the regulatory institutions to control the negative effects of illegal mining on the surrounding communities?
4. What coping strategies do people use in face of the negative effects of illegal mining?

5. What policy interventions cam be recommended to control the illegal mining in Atiwa Forest Reserve?

Significance of the Study

The study is important in three different ways. First and foremost, the study's conclusions will assist decision-makers in implementing policies that will successfully address the problem of *galamsey*, particularly in the Atiwa Forest. This is because the study's findings will give decision-makers direct knowledge of the issue. Given the paucity of relevant empirical research, this is pertinent.

Secondly, the findings will also complement the already existing literature on illegal mining in Ghana. Previous studies on illegal mining in Ghana have not examined it from the human security perspective (Cobbina, Myilla, and Michael, 2013; Obiri, 2011). This creates a research gap. In light of this, the results of the research will help close the information gap by looking at the impact of illegal mining on human security in Ghana, and specifically in the Atiwa Forest. For instance, the present study will make an invaluable contribution to the literature on conflict as a human security issue in mining areas. Previous studies that have examined conflict in mining areas in Ghana focused on other geographical areas (e.g., Hilson &Yakovleva, 2007). With the focus on Atiwa Forest, the present study offers a fresh perspective on conflict in mining areas in Ghana.

Finally, the study makes theoretical contributions to the theory of human security, Maslow's theory of needs, and resource curse theory. The study extends the literature on human security theory and Maslow's theory of needs by applying them to issues of illegal mining. In Africa, the literature on resource curse theory

has focused on conflicts in countries such as Sierra Leon (Nyame & Grant, 2014). Because it adds to the body of research by concentrating on Ghana, the current study is significant.

Scope of the Study

For a study of this nature, it is important to set boundaries to allow for a manageable scope. The first delimitation of the study concerns geography. In this regard, the study focuses on the Atiwa Forest, which is located in the East Akim Municipality of Ghana. Specifically, the present study limited its focus to Kibi, Adadetem and Ankwadum communities, based on the advice of the Forestry Commission.

Another delimitation concerns the specific issues the study investigates. The study specifically focuses on the effects of illegal mining in the study area and examines the coping strategies adopted by the inhabitants of the study area to mitigate such effects. There is evidence that illegal mining may have both positive and negative effects (Kusi-Ampofo & Boachie-Yiadom, 2012; Saunders et al., 2013; Stephens & Ahern, 2001). However, the study focuses on the negative effects of illegal mining in the Atiwa Forest, and the effects are examined within the human security framework. The study also recommends some policy interventions to aid remedy the situation.

Limitation

It is important to acknowledge the limitation of the study. The main limitation of the study concerns its research approach. The study adopts the qualitative methods to data analysis. While this approach allows for in-depth

investigation of the matter, it becomes incapable of allowing for generalisability of the findings. In effect, while the findings of the present study will be relevant to the study area, it may not have a wider generalisability.

Organisation of the Study

Information in this thesis is presented in five chapters. The first chapter situates the study in context by providing, among others, its objectives and significance. Chapter Two assesses the literature on the subject, both theoretical and empirical, and provides a conceptual framework to direct the investigation. The methodology is in Chapter Three. The findings or outcomes are presented in Chapter Four along with the discussion. The study closes in Chapter Five, with a summary of the entire research, key findings, and areas for further investigations.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter reviews pertinent literature related to the present study. In this regard, I first present the theoretical framework that underpins the study. This is followed by a review of empirical literature. The purpose of the review is to provide a theoretical and empirical basis for the present study.

Theoretical Framework

This section discusses the theoretical literature that underpins the present study. Essentially, the study is grounded in three theories: a) human security theory b) Maslow theory of needs and c) resource curse theories.

Human Security Theory

The Latin term *securitas*, which denotes peace and stability or the lack of concern, is where the word *security* gets its source (Liotta, 2014). Relying on this conceptualisation of security, Kraft (2007) argues that a society characterised by human security is where citizens are allowed to raise their security concerns to the government for redress to the benefit of all. Human security, therefore, involves the understanding that the security of people involves the safety and peaceful co-existence of individuals as well as their participation in the process of governance (Chowdhury, 2018). Thus, at the national level, human security ensures a society where individuals peacefully co-exist and are able to freely get involved in the government of the nation. In this study, human security is operationalized in terms

personal, community, health, food, political, economic, environmental security. In essence, human security is measured in this thesis using these seven dimensions.

The International Committee of the Red Cross's activities during the 19th century can be credited with giving rise to the idea of human security. Through that work, the defence of people against nameless hazards was promoted, and global organisations provided support when necessary (Chowdhury, 2018). In subsequent years, the concept got official recognition by the United Nations, through its Human Development Report (UNDP, 1994, p. 23):

> Human security has two main aspects. First, safety from chronic threats as hunger, disease, and repressions. And second, it means protection from sudden and hurtful disruptions in the patterns of daily life – whether in homes, in jobs or in communities. Such threats can exist at all levels of national income and development.

This definition highlights two key components of human security. On the one hand, it recognises hunger, disease and repression as threats to human security. On the other hand, it considers all forms of disruptions in the daily lives of humans as threats to human security. The emphasis laid on these two issues in this definition is important to the present study. For example, the literature on mining in other parts of Ghana has revealed the outbreak of diseases due to the chemicals used in the mining activities (Awudi, 2002).

The United Nations Development Programme (1994) again categorised the concepts into (a) freedom from fear and (b) freedom from want. What this means is that, in a society with human security, there should not be problems that

will put fear in people and neither should there be cases where people will be in need or want. Tanaka (2015) advanced this view, adding that these two core components of human security border on physical, biological and social systems.

Generally, human security is considered as having four main characteristics. In the first place, it is considered a universal construct. This means that everybody needs human security. It is needed not only in poor countries but also in rich countries. Secondly, it has interdependent components. This suggests that if one component of human security is negatively affected, other components are likely to also suffer the negative impact. Again, it is prevention-oriented. It deals with how individuals interact with their environment and how readily they express their diverse options (UNDP, 1994).

The UNDP (1994) asserts that the concept of human security represents an evolution in two key aspects in our understanding of security, which has traditionally been more preoccupied with the state's security than that of the individual. This new understanding of security is necessary because without security in people's homes and places of employment, war will continue to erupt throughout the world (Dajahar & Alheri, 2018). This conception of human security—that is, as a concept that is centered on people rather than the state—is pertinent to the current investigation. The study's goal is to determine how unlawful mining may affect the quality of life for residents of villages near the Atiwa Forest.

In addition to the conceptualisations of human security outlined above, the term can be analysed from two angles: the narrow and the broad. The "narrow"

definition describes it as a lack of dangers to a person's personal security or safety. According to this viewpoint, security should be centred on people (Human Security Report, 2005). According to this theory, governmental institutions can contribute to human security (Chandler & Hynek, 2011). The bigger picture, on the contrary, sees human security as linked to progress. This is consistent with how the UNDP views development. Consequently, the concept encompasses threats to the economy, surroundings, food supply, wellness, and personal as well as social and political stability (Chandler & Hynek, 2011; Human Development Report, 1994; Roberts, 2010).

The comprehensive approach also emphasises the health and worth of people while acknowledging the interdependence of the challenges to human security. Instead of concentrating primarily on states and organisations, it encompasses the security of people as a whole. At the level of the person, the concept of "safety" is expanded to include a life that is worthwhile (that is, the wellbeing and dignity of humans) in addition to the state of merely existing survival (Martin & Owen, 2014). In order to prevent violence and life instability, the wide approach concentrates on persistent dangers (Liotta & Owen, 2006).

The UNDP divided human security into seven categories: (a) economic security (threatened through destitution, joblessness, etc.); (b) food security (threatened through starvation and malnutrition, affected by catastrophic weather conditions and farming changes); (c) health security; (d) environmental security (threatened through depletion of resources, danger to emissions, degradation of the environment, and pollution); (e) personal security (threatened by criminal

activity, domestic abuse, catastrophes, and bodily violence); (f) community security (threatened by infractions of societal ethics; the susceptibility to harm caused by social internationalisation; and (g) political security (threatened by political persecution, violations of constitutional rights, etc. (UNDP, 1994).

The present study investigates how illegal mining operations at the Atiwa Forest Reserve affect the human security of the people living in Kibi, Adadetem and Ankwadum communities. The research considers the broad perspective of human security to allow for an exploration of the issues from a panoramic perspective, so as to include even illegal-mining related problems that may indirectly pose threat to the human security of the people.

Maslow's Theory of Needs

Abraham Maslow was a prominent psychologist of the 20th century and is best known for creating the "hierarchy of needs" theory. Maslow first proposed a ranking of five fundamental demands that are arranged from most basic to most important for an optimal human condition (Noltemeyer, Bush, Patton, & Bergen, 2012).

The simplest and primary need is the physiological need, which is located at the bottom of the triangle. This entails a desire for minimalistic life necessities including water, air, food, and a place to live. Safety requirements, under Maslow's hierarchy of needs, are on level two. Prior to starting to feel the need for safety, physiological demands are met. Love and belonging stand in for the third degree of needs. These wants are those of affiliation, or the need to be cherished and accepted by others. Esteem requirements are a representation of the fourth

degree of needs. It includes the need for acceptance from other people and respect for oneself. Self-actualisation is the final level, at the top of the triangle. The idea being expressed here is that for a person to fulfil their fullest potential, one must make an effort to become all that they are worthy of accomplishing (Kaur, 2003).

Maslow (1943) believed that a person could only proceed progressively and fully to the attainment of growth needs when deficiencies were satisfactorily met:

It is quite true that man lives by bread alone —when there is no bread. But what happens to man's desires when there is plenty of bread and when his belly is chronically filled? At once other (and "higher") needs emerge and these, rather than physiological hungers, dominate the organism. And when these in turn are satisfied, again new (and still "higher") needs emerge and so on. This is what we mean by saying that the basic human needs are organized into a hierarchy of relative prepotency (p. 375).

Maslow continued by saying that it is possible for an individual to be inspired by multiple wants at once, even if a particular level of need happens to prevail at a given time. For example, a child who feels rejected may still be able to meet their requirements for respect, though maybe not in the same way they would if their needs for sense of belonging were fully met. Maslow further stated that regardless of whether they have been satisfied, deficient desires may resurface as inducements if they pose a threat in the future. For instance, parents who experiences an unplanned job loss may find themselves momentarily abandoning insufficiency requirements (such as guaranteeing their family's food

safety) in order to focus their mental and psychological energies on meeting growth needs (such as accomplishment or self-esteem). Maslow would only say that a person has attained optimal functioning if deficiency and growth requirements have been met (Noltemeyer, Bush, Patton, & Bergen, 2012).

Maslow (19) asserted that certain ambitions are more essential than others and that people seek to accomplish them. As long as we are alive, our own survival remains our most basic need and govern our behaviour. The next level above, and so on, is what motivates us when the previous one was successfully attained. Figure 1 is the pictorial representation of the hierarchy of needs.

Figure 1: Maslow's Hierarchy of Needs

Source: https://www.simplypsychology.org/maslow.html.

Over a period of many years (Maslow, 1943, 1962, 1987), Maslow continued to expand his model, which rested on the concept of a hierarchy of needs. According to Maslow and Lewis (1987), the system's order "is not nearly as rigid" (p. 68) as he might have believed in his original representation.

Maslow asserts that a person's or a scenario's needs pyramid may alter. For instance, he makes the observation that certain individuals prioritse their quest for self-worth over their desire for affection. Some people could have desires that go past the basic ones, such as the urge for artistic fulfilment. According to Maslow (1987), "any behaviour tends to be determined by several or all of the basic needs simultaneously rather than by only one of them" (p. 71). He also emphasised that most behaviour is multi-motivated. This theory is chosen because it is in line with the study. It is people's quest to satisfy their needs that lead them to engage in illegal mining. On the other hand, the illegal mining also affects the human security needs of the people.

Resource Curse Theory

Natural resources are typically seen as being of utmost importance to the socioeconomic development and success of every country. With a few exceptions, such as Norway, the experiences of several resource-rich states during the 1960s, however, imply that economic success is not always a result of a wealth of natural resources (Chekouri et al., 2017). This has given rise to the widespread belief that resource-rich countries typically perform economically worse than resource-poor ones. In contrast to their counterparts with less rich natural resources, such as Japan, Korea, Singapore, Taiwan, and Hong Kong, several nations with an abundance of resources, notably those in Africa, the Middle East, and Latin America, demonstrate lacklustre economic growth. The "natural resource curse" refers to this perplexing occurrence (Idemudia, 2012).

Auty (1993) coined the phrase "resource curse" for the first time in history. The phrase was introduced by Auty to explain the perplexing correlation between the quantity of natural resources and economic growth. He pointed out that wealthy nations have not only failed to harness their natural resources to support economic and social growth, but also have a propensity to do worse than those who are not as well off (Chekouri et al., 2017).

The existence of the curse of resourcefulness and the causes linking mineral wealth to poor economic, political, and cultural results have been subject to discussion. Brunnschweiler and Bulte (2008), for example, challenged the validity of the curse for resources by asserting that the data supporting it was actually lower than anticipated. Corresponding to this, Dunning (2008) barely challenged and Haber and Menaldo (2011) completely refuted the claim that resources from nature and democracy are negatively correlated. The latter clarifies how dependence on oil and other natural resources does not, in the long term, support authoritarianism. Karl (2007) asserts that the resource curse is essentially a matter of politics as opposed to simply a matter of finance. Others have maintained that the curse of resources thesis is limiting, predictable, and sometimes ignores the impact of social variables or external global and geoeconomic environments in influencing political as well as financial consequences in nations with abundant resources. These critics include Rosser (2006) and Cramer (2002).

In an effort to respond to these critiques, more in-depth analysis of the contextual variables and precise causal processes that decide whether the curse of

resources will manifest, how it will manifest, and what the best course of action should be in terms of policy has been conducted (Basedau & Lay, 2009; Robinson et al., 2006). This has resulted in an agreement that suggests the issue of the "natural resource curse" extends beyond the mere existence of natural resources to include the systems of governance and businesses around the extraction process, manufacturing, and administration of the resulting earnings which dictate whether natural resources will be an advantage or a curse (Ackah-Baidoo, 2012).

For instance, studies have shown that the natural resource curse is often intensified by the poor quality of institutions in resource-rich countries (e.g., Acemoglue et al., 2005; Ross, 2012). Sala-i-Martin and Subramanian (2003) and Brollo et al. (2013) contend that an excess of natural resources can have further detrimental impacts on economic growth in resource-rich developing countries because of personal interest of the political elites. Similarly, Barro (1999) and Leite and Weidmann (1999) showed that resource abundance boosts the degree of dishonesty and that fraud in turn has a negative impact on economic performance.

The interplay between institutions and resources is a key factor connecting natural resources and unfavorable political and economic consequences, according to Robinson et al. (2006). Kolstad (2009) asserts that the government sector organisations, which regulate resource utilisation and appointments in public sectors, and the business community structures, which regulate the financial viability of effective enterprises, are the two main entities that link the excess of natural assets with the resource curse. Therefore, initiatives aimed at enhancing or developing institutions that will discourage corruption and enable

public sector accountability will aid in reducing the negative consequences of the resource curse.

According to certain resource curse literature, having access to abundant natural resources seems to increase the likelihood, severity, and length of civil war (Collier & Hoeffler, 1999). The Sierra Leonian civil war in the 1990s is believed to be fuelled by the abundance of diamond, a natural resource (Maconachie & Binns, 2007; Wilson, 2013). Other examples include Liberia and Congo (Englebert & Ron, 2004). In the present study, I investigate the issue of illegal mining and its human security implications on the residents of Kibi, Adadetem and Ankwadum communities. I, therefore, use this theory to explain how minerals (such as gold and diamond) which are supposed to be a blessing have become a curse to the people in the study area. Attention will be given to the role of the institutions governing resource extraction in controlling the effects of illegal mining on the human security of people living in affected communities.

Conflicts are said to result from unlawful mining, as well. Engels (2016) divides these disputes into three categories: (a) disputes between civil society organizations and the government and mining firms; (b) disputes between labor unions and mining firms; and (c) disputes between small-scale miners and mining firms. Pijpers and Eriksen (2019) contend that, in the context of mining operations, conflicts develop as a result of frictions between individuals and organizations with various agendas, worldviews, and goals. According to Castro and Nielsen (2003), conflicts develop when individuals or organizations' desires,

principles, authority, opinions, and intentions differ from or are incompatible with one another with regard to a particular issue.

Mining and Illegal Mining

Mining is a process performed to get minerals that are organically available. It is one of the globe's foremost sectors and it is vital for the continued growth of the worldwide market (Down & Stocks, 1977). According to Madeley (2000), a sizeable portion of global trade is the trading in mineral commodities. Mining can be done either above ground or underground. Compared to underground mining, surface mining often produces the same number of ore for less money and with fewer personnel. Regardless of the sort or amount of mining being done, investment in mining requires a lot of capital.

In sub-Saharan Africa, illegal mining by artisans has been found to have detrimental economic and ecological repercussions (Fisher, 2007). Industries has been expanding exponentially and wildly, especially in Ghana, in recent decades, leading to an array of concerns that the authorities find challenging to handle (Amankwah & Anim-Sackey, 2003; Hilson & Potter, 2005). Despite these adverse outcomes, nation-wide elected representatives regularly claim that alluvial extraction of minerals is still an essential supply of income, employees have close connections to extraction terrain, and mines have long been the lifeblood of rural areas.

Policymakers, however, frequently present conflicting arguments in order to clarify the recent increase in artisanal and small-scale mining (ASM) operations in sub-Saharan Africa. Although "opportunism" and people's desire to

"get rich quick" are frequently put forth as reasons, the most widely acknowledged cause is widespread poverty (La-bonne, 2003). People get involved in ASM because there are not many other options to get money. For instance, Labonne (2003) claims that artisanal mining has developed as a source of revenue, supplementing more conventional forms of agricultural survival income, because it is predominantly driven by hardship. *Galamsey*, the local term for illicit artisanal mining, has increased in prevalence in Ghana from 30,000 or so people in 1995 (World Bank, 1995) to one million in 2007 (Bawa, 2006). While government officials long ago authorised ASM, enabling prospective applicants to follow an array of straightforward criteria so as to obtain a price reduction, poor policies and ineffective infrastructure have delayed regulation, rendering illicit mining more enticing.

Many structural adjustment programs (SAPs), especially within the governmental field, are responsible for nationwide joblessness, which has prompted thousands of other Ghanaians to relocate to *galamsey* communities in search of work (Banchirigah, 2006). The growth of massive mining activities, a goal of the government during reform, has also contributed to landlessness and potential ASM proliferation (Hilson et al., 2007).

The difficulty of miners quitting their jobs due to their impoverishment cycle is another issue raised in the ASM-poverty conversation. Noetstaller (1996) considered plenty of factors for the issues that workers faced. Using this methodology as a foundation, Hilson and Pardie (2006) identify the operators' dependency on mercury as one of the main causes of the growing destitution in

ASM areas. Despite this proof, some pundits still maintain that miners purposefully break the law and are uninterested in obtaining a license. Despite the well-known hardships they face, some people observe miners having fun at work. The inadequate reaction of miners to government and corporate sector partners' efforts to create alternate sources of income in rural areas has furthered this impression in Ghana (Hilson & Banchirigah, 2008). However, the reality is that illicit artisanal mining is widespread in Ghana, and unless policymakers have a better grasp of why this is the case, they will not be able to address the issue. In view of this, it is important to conduct a study into the human security implications of illegal mining in Ghana, in order to provide findings that will serve as empirical basis for action towards combating the practice. This underscores the need for the present study.

History of Mining in Ghana

According to available evidence, Ghana's gold extraction operations date back to the seventh and eighth centuries AD, when the nation's gold mines drew Arab traders (Hilson, 2001). When deposits thought to contain gold ore were regularly cleaned to extract gold particulates, rivers were strategically chosen as the location for such operations (Hilson, 2002). The mining settlements and the miners themselves benefited from this sort of revenue. Iron, limestone, kaolinite, and other clay mineral deposits have been shown to exist in significant amounts over time (Akabzaa & Darimani, 2001).

However, gold accounted for 90% of the minerals that were extracted, making it the dominant mineral (Akabzaa & Darimani, 2001). Even though

Ghana's economy was largely based on agriculture, a few small-scale *galamsey* miners made a good livelihood by extracting and smuggling these precious metals (Aryee, Ntibery, & Atrkui, 2003). Without taking into account the negative implications of their activities on society, politics, or the natural world, these individuals largely sought ways to enhance their personal financial objectives. The differences in mining methods, operating legality, and mining volume differentiate Ghana's mining into two main methods: large-scale legal mining and small-scale illegal *galamsey* mining. The latter is done on an individual basis, primarily by the impoverished, who have minimal access to equipment or technical understanding. It is estimated that over ten million individuals engage in small-scale mining directly, and another 8 to 100 million others rely directly or indirectly on the output of these enterprises for their subsistence (Remy, 2003). Most of these people are not miners voluntarily chosen, but out of necessity. Different groups and countries view small-scale mining from different perspectives.

The International Labor Organisation defines small-scale mining as low-intensity and operation using basic or low-level machinery (International Labor Organisation, 1999). In Ghana, small-scale mining involves "the mining of gold through technology that does not involve a large number of individuals or a group of ten or more people to support the large expenditure of the society" (Small-scale Gold Mining Law, 1989). Large-scale mining, usually referred to as legal mining, produces more than 95% of the minerals that are mined worldwide and employs

over 2.5 million people worldwide (Kunanayagam, Mcmahon, Sheldon, Strongman, & Weber-Fahr, 2002).

Approximately 16 gold mines, one bauxite mine, and one manganese mine are all operated by 19 big mining corporations in Ghana. These are private businesses that have an alternative government stake of 20% and a free share of 10%. The Ghanaian government is devoted to advancing these significant mining firms' interests (Jenkins & Obara, 2006). The ecology and nearby waterways are negatively impacted by some operational standards and techniques, though. Mining firms exploit their legal standing to cause environmental damage. All three phases of mining operations—mineral extraction, processing, and transportation—require the use of water (Mavis, 2003). Water is typically delivered during these operations from adjacent rivers. Mine water that isn't needed can be recycled or released back into surrounding water sources (Mavis, 2003). Nevertheless, since purification is so costly, several mining companies just discharge unprocessed water into rivers.

Mining and Livelihoods

People have employment prospects thanks to small-scale mining. If handled effectively, the small-scale mining industry could give many individuals in the rural areas where the mines are located work. Jobs can be full- or part-time, and in some situations, they end up being a person’s only source of revenue. Over 20–30 million people receive employment and income from small-scale mining worldwide, and more than five times as many depend on it for a living. According to Amankwa & Anim-Sackey (2003), approximately 100,000 people were

engaged by legally operating small-scale gold and diamond miners in Ghana in 2003.

Rural mining has aided in local economic growth and the eradication of destitution. The mining industry contributes to the advancement of skills by turning unskilled labour into semi-skilled and skilled personnel. Small-scale mining ventures provide significant prospects for the growth of indigenous enterprises because they have low entrance barriers in terms of capital demands and formal schooling requirements. The majority must work in small-scale mining in many rural areas where there are no white-collar jobs and the few that are available pay low wages in order to survive (Yakovleva, 2007). The small-scale mining business not only creates direct jobs but also a sizable number of indirect jobs in the form of manufacturing, logistics, and other services in other economic sectors. Goldsmiths, traders, and restaurateurs are other individuals who are indirectly connected to the small-scale mining industry and who all rely on mining for their lives.

Additionally, research demonstrates that mining operations improve quality of life (Hoadley & Limpitlaw, 2004). Mining enhances rural people' quality of life, and it has a particular influence in developing nations. Despite these benefits, mining typically has negative repercussions as well, particularly on people's livelihoods (Chupezi et al., 2009). People typically go to mining regions to hunt for job and to rely on those who are employed there, according to Amoako and Abew (2009). As a result of this, when the mines are closed, a lot of people live in abject poverty as mining is their sole source of livelihood. Additionally,

the variety of economic activities offered by mining is insufficient to support the lives of those living in mining villages.

In their study, Hoadley and Limpitlaw (2004) focused on the contribution that small-scale mining may make to sustainable development and the reduction of deprivation in Africa. Although small-scale mining has the potential to reduce poverty, it has been found that in an unregulated environment, this potential is rarely realised. As a result of this, governments over the world are putting up measures to regulate mining. The investigation also found that, in order to ensure long-term community backing, cooperation between large- and small-scale mining businesses could be encouraged.

In a previous study, Bannock Consulting Limited (2005) looked at how small-scale mining societies' means of livelihood were affected by price changes. It was stated that price swings in these areas had an impact on household budgets for necessities like food and clothing as well as the desire for locally made goods and services. It was also discovered that although price changes undoubtedly have an impact on these communities' means of subsistence, their susceptibility to other non-financial shocks including land relocation, disputes, crashes, pollution, and social unrest is also significantly more significant.

In the Wassa West and Upper Denkyira Districts of Ghana, Amoako and Abew (2009) examined the various substitute livelihood programs implemented by certain mining firms and their efficacy with a focus on the pre-, during-, and post-mining livelihood of the residents of the mining communities. They also put forth a plan for viable alternative livelihoods for mining towns. The study

discovered that small-scale mining, trade, and agriculture were the primary sources of income for both men and women prior to the beginning of the mining industry. Small companies and agricultural-based endeavors are included in the mining firms' alternate income programs. The study also showed that whereas the majority of individuals were involved in mining-related economic activity while the mine was open, after the mine closed, the majority of people turned jobless.

The study by Amoako and Abew (2009) mentioned above confirms the conclusions of an earlier study by Awumbila and Tsikata (2004), which looked at how the relocation of small-scale gold miners affected the lifestyles centered on gold mining in the Talensi-Nabdam region of Ghana. Prior to the development of mining in that region, agriculture, sheanut collection, and fuel wood collecting were the primary sources for materials and earnings, according to their study. The local economy's dependence on the gold mining industry has been reorganised as a result of the inflow of small-scale gold miners into the region. Additionally, it was discovered that while moving to the area for the purpose of gold mining created opportunities for community involvement and had the ability to reverse north-south migration trends, access to and enjoyment of the positive aspects of gold mining are obviously gendered.

With a particular focus on the gold and diamond mining industry in the Mwanza Region, Mwaipopo et al. (2004) conducted research in Tanzania on the impact of artisanal and small-scale mining to decreasing poverty. The authors also analyzed the scholarship on livelihoods that is now available in Ghana and evaluated the major policy issues that the sector is currently experiencing. The

study found that populations that engage in mining activities have a lower incidence of economic distress than groups that do not, indicating that artisanal and small-scale mining has a significant possibility to reduce impoverishment. Artisanal and small-scale mining increases people's ability to support themselves and lessens their likelihood of poverty by serving as a means of generating money, accumulating assets, and investing. More importantly, it generates cash that strengthens local buying capacity and the market for products made locally, such as nourishment, instruments, dwellings, and upholstery. Building, production, and other sectors like agriculture gain more employment as a result.

A study by Chupezi et al. (2009) that sought to shed light on how artisanal and small-scale mining in the Central African Republic affects local residents' lives and the environment is closely related to one by Mwaipopo et al. (2004). According to the report, mining gives over 3,000 miners and their families a sizable income that covers all of their essential basic needs. In addition, the authors stated that mining provided miners with a variety of options, such as help in obtaining tools and legal documents. On the other hand, the study found that the study area's small-scale mining industry is marked by inadequate governance and informality.

Empirical Review

This section delves into the empirical studies on illegal mining and its implications. It was done by reviewing the extant literature in relation to the focus of the thesis. Several of the works reviewed affirmed the devastating effect of illegal mining on the human lives.

Mining and Human Security

Schueler, Kuemmerle, and Schröder (2011) examined the impact of surface gold mining on land use in Western Ghana, focusing on the Wassa West District. Deforestation and farmland losses were shown to be two consequences of mining in the study area. This was caused, in part, by the fact that farmers were regularly compelled to move in order to make room for mining operations. When they move, they clear additional farmland, indicating substantial spillover effects of mining into nearby areas. The study also showed that surface gold mining contributed to environmental destruction. These findings point to the rapidly eroding foundations of livelihoods. This study emphasises how mining operations affect both environmental and economic security.

Cobbina, Myilla, and Michael (2013) investigated the effect of small-scale mining on water quality in Datukua. In their study, they tested for the physico-chemical properties of about seventy-two samples of water collected from six sources of drinking water. Their findings revealed that concentrations of nitrate, turbidity, and four trace metals in some of the samples (As, Cd, Fe, and Mn) were above the recommended levels of WHO. This was a clear indication that the water sources were not safe for human consumption. Drinking polluted water may have serious implications on the health of people, affecting their health security. This, therefore, suggests that illegal mining can have health implications on the human security of people in surrounding communities.

Similar to the study conducted by Cobbina et al. (2013), other published literature investigates the consequences of miners on the wellness and security of

mine employees and local inhabitants. Amedofu's (2002) examination into the auditory loss caused by gold extraction on personnel of a gold mining firm in Ghana is significant among such studies because it showed how the mining process damaged most participants' hearing capacities. In a similar vein, Gyamfi et al. (2016) used a cross-sectional approach to investigate the level of noise exposure and its impact on quarry employees' hearing capacities in the Ashanti Region. Four hundred workers were randomly recruited from five quarries for the study, and the participants completed structured questionnaires, underwent physical examinations, and had their hearing evaluated.

Data were then analysed using a logistic regression model. The study found that every machine utilised at the various quarries generated noise that was louder than the legal limit, with 176 (44%) of study participants having hearing thresholds above 25 dBA and 18% and 2% having moderate (41-55 dBA) and severe (71-90 dBA) hearing impairments, respectively. The study also showed that the usage of earplugs, age, and length of employment all independently predicted the development of hearing loss. This research concentrated on hearing impairment, despite the fact that a wide range of health concerns have repercussions for people's health security. This highlights the limits of these investigations, which call for additional research.

Stephens and Ahern (2001), who pointed out that mining is one of the world's most hazardous jobs, noted that it can cause both immediate harm and long-term effects, including malignancies and lung diseases like silicosis, asbestosis, and pneumoconiosis, which are typically brought on by dust exposure.

The authors claim that while people in surface-mining locations are exposed to health concerns due to dust inhaling, considering the dangers of hypertension, heat fatigue, coronary artery disease, and neurological disorders, deep mines seriously harm employees. This research emphasises how mining causes significant illnesses like cancer and pneumoconiosis, adding to the corpus of information on how it affects health security.

In addition to the previously noted negative effects on health and safety associated with illicit mining, studies show that the industry has been impacted by the global HIV/AIDS epidemic. For instance, it has been shown in several studies that migrants are a significant factor in the spread of HIV/AIDS in mining towns. Many miners made significant investments to set up HIV-prevention initiatives shortly after its outbreak, but these initiatives appear to have had minimal impact, according to one study (Campbell & Williams, 1999) on how the mining sector responded to this problem.

According to reports, small-scale mining operations in Ghana discharge roughly 5 tons of mercury annually (Asklund & Eldvall, 2005). As a result, kidney disease cases have increased in Ghana's mining regions (Kusi-Ampofo & Boachie-Yiadom, 2012). While the inorganic variety of the metal is commonly utilised by workers to retrieve gold, it easily evaporates into the environment or gets discharged into rivers. Because these compounds have the potential to injure people, flushing them into water sources poses a serious risk to public health. It has an impact on the respiratory system, gastrointestinal tract, neurological system, and renal system (Obiri, 2011).

Yeboah (2008) examined how mining operations affected five particular settlements (Sanso, Anyinam, Anyinamadokrom, Abombe, and Tutuka, all in the Obuasi Municipality) and their residents' health. He learned that the inhabitants regularly contract catarrh, fever, colds, diarrhea, and skin disorders. Malaria was the primary cause of over 42% of the illnesses identified in the survey, which was followed by respiratory diseases (27%) and diseases of the skin (17.7%). In the study area, 13.6% of those surveyed said they had a high temperature, loose stool, or other signs of illness. Anyinam (37.1% of respondents), which is near to AngloGold Ashanti's open pit site, where heavy equipment is routinely used for eliminating the top soil and shatter rock, had the greatest incidence of colds or coughs. The research claims that some people's drinking water, food supply, and other home needs are now being met by polluted water supplies. Amansie West District has a higher frequency of Buruli ulcer than other districts in Ghana, and this suggests that contact with small-scale gold mining, or ASGM, may be an indicator of risk for the illness (Duker et al., 2006). Buruli ulcer has been linked to land use modifications that frequently go hand in hand with ASGM activities, such as streambed disturbances (Benbow et al., 2005; Raghunathan, 2005).

Additionally, it has been noted that mining locations have a high rate of HIV infections (Amponsah-Tawiah & Dartey-Baah, 2011). According to the authors, women search for jobs in mining towns before being compelled to turn to sexual activity as a last resort, which ultimately contributes to the transmission of HIV. This shows that people who work in the mining industry may be particularly susceptible to sexually transmitted diseases like HIV, AIDS, and other STDs

(Banchirigah, 2008). The conditions brought on by blowing and exploration operations and the ensuing sound and dirt, which have become allergens in mining regions, include hearing loss and silicosis. Mining activities also have other health and social effect (Amponsah-Tawiah & Dartey-Baah, 2011).

The Obuasi hospital's biostatistics, according to Awudi (2002), showed a substantial frequency of upper respiratory tract infections (URTI) in the area, which doctors ascribed to the region's mining activity and associated pollution. Patients at the Ashanti Gold Company (AGC) hospital in Obuasi have shown clinical symptoms resembling arsenic poisoning in this manner. These illnesses were linked to the aerial pollution caused by the AGC's mining processing. Acute conjunctivitis, malaria, diarrhea, upper respiratory tract infections, and other illnesses have all become more prevalent in the Tarkwa region as a result of mining activity.

The Tarkwa area had the highest rate of malaria in the Western Region and the entire nation, according to Akabzaa and Darimani (2001). Additionally, communities near rivers and streams are more likely to get skin rashes than other communities since these areas frequently absorb leaking cyanide waste waters and other mining contaminants from concessions. The effects of mining on health and security have been emphasised by these studies. These studies, nevertheless, are out of date because they were done decades ago. Once more, Atiwa Forest was not the focus of these investigations. This emphasises the necessity for the current study, which focuses on Atiwa Forest, to offer new insights into the health and security repercussions of illegal mining in Ghana.

Thus far, the discussion has been on the health security implications of illegal mining. However, some studies have examined other components of human security. The studies have shown that although contaminants from the gold extraction procedure place an additional strain on the natural world (Yelpaala, 2004), environmental insecurity that results from illegal mining activities also leads to health insecurity. This, therefore, confirms the view that human security threats are interrelated (UNDP, 1994).

In the Philippines, a study by Drasch et al. (2001) revealed the detrimental impact of illegal mining on environmental security. Both the neighboring community and the workforce had their biomonitoring and medical scores obtained. Harada et al. (1999) conducted a similar study and discovered lower levels of intoxication as well as a more complicated mixture of external exposure to mercury from mining and home products like soap. Harari (1997) and Rojas et al. (2010) are two further studies of this type.

According to numerous studies conducted in Ghana's mining towns, the mining industry is responsible for environmental issues such as pollution and soil degradation. In order to make room for surface mining operations in Tarkwa, a sizable portion of the land and flora were destroyed, claim Akabzaa and Darimani (2001). Open pit mining leases now comprise over 70 percent of Tarkwa's total land area. The land and plants, which are the main sources of the people's livelihood, are being severely harmed by this.

In addition, Akabzaa and Darimani (2001) note that the environment in most of Tarkwa is rapidly deteriorating and losing much of its enormous

economic worth every year, mostly as a result of the region's dense concentration of mining operations. The fallow time has been shortened from 10-15 years to 2-3 years due to the loss of agricultural land, which has also resulted in overall degradation of agricultural areas. The conventional bush fallow arrangement, which efficiently reused significant quantities of soil nutrients and rendered the cycle that followed effective, is no longer feasible due to a lack of acreage. Large-scale mining operations typically keep reducing the local vegetation to levels that are harmful to ecological diversity.

Additionally, even when the mine is decommissioned and new trees are planted, the deforestation caused by surface mining still persists. The prospective introduction of new species could have an impact on the topsoil's composition, which would subsequently affect the soil's fertility and the amount of time that specific crops would be allowed to fallow. When surface vegetation is eliminated, there is not just erosion but also a decline in the land's suitability for farming and a loss of habitat for wildlife like birds. This has caused the devastation of the abundant ecology, water sources, cultural sites, and plant life (Akabzaa & Darimani, 2001).

Mining activities and related companies cause particles to be discharged into the environment. The main issues with the air in the areas affected have been floating particles, carbon dioxide emissions, sound, and tremor. Others include the vapors produced when sulphide ores are roasted in assay laboratories and throughout the refining process. Due to the high silica content of the dust

produced by gold mining operations, the region has seen an increase in silicosis and silico-tuberculosis (Akabzaa & Darimani, 2001).

The destruction of large areas of agricultural land, which causes soil erosion, causes lithosphere damage in mining settlements in Ghana. Small-scale mining is allegedly closely linked to extensive land degradation, according to the Centre for Development Studies (2004). Additionally, previously vegetated regions are degraded and dug out pits from small-scale mining aren't reclaimed (Donkor et al., 2006). Lands virtually stripped of vegetation following mining operations are relatively frequent in many small-scale mining zones across Ghana's mining towns (Hilson, 2001).

Akabzaa and Darimani (2001) claimed that over 70% of Tarkwa's entire land area is now under the control of open-pit mining concessions. According to estimates made by Akabzaa and Darimani (2001), a mining corporation would have used between 40 and 60 percent of the overall concession area at the end of mining for things like transfer of dislocated populations. The importance of land as a natural resource in the mining industry is thus explained. People who reside in the mines' catchment region may suffer adverse repercussions from these operations on their quality of life. Without a doubt, the terrain on which small-scale gold mining operations take place has suffered tremendous harm.

The negative effects of unlawful mining on environmental security immediately damage water bodies. Due to severe siltation, small-scale mining significantly alters water channels and pollutes rivers and streams. The majority of small-scale mining operations increase river sedimentation, particularly when

using hydraulic pumps and suction dredges, which occasionally alter the surrounding terrain. Others make rivers dangerous for human use by adding harmful chemicals to them (Offei-Aboagye et al., 2004).

The broad discharge of mercury also has an effect on public health and environmental security. The majority of the time, mining activities immediately release the mercury that is used to extract gold into the environment. Through the soil, the discharged mercury travels to humans where it creates issues for many people. It also enters the food chain and drainage system. In addition to causing lasting brain damage, prolonged exposure to mercury can make people feel sick, have diarrhoea, and lose their sense of smell. Mercury is released into the environment either by disposing of waste materials directly into rivers or by burning the compound and releasing mercury vapours into the atmosphere (Donkor et al., 2006).

Small-scale miners typically engage in actions that aim to lower the water table or reroute watercourses away from the mining areas. The natural riverbed is disturbed and disrupted as a result, which eventually causes surface water contamination. In Ghana's Tarkwa mining regions, a study by Akabzaa and Darimani (2001) highlighted four primary issues with water pollution. These include chemical contamination of streams and groundwater, increased sediment load-related siltation, increased faeces entering water bodies, and dewatering consequences. Many miners deliberately try to reduce their water table or divert important waterways away from their activities. This project will have a detrimental effect on the overall quality and quantity of surface and ground water.

Another environmental issue with small-scale mining is atmospheric influence. Particulate matter that is hazardous to human health is released into the air as a result of mining activities. Akabzaa and Darimani (2001) noted that Tarkwa mining area residents face health risks from dust particles smaller than 10 microns. All fine dust has the potential to induce respiratory illnesses at high exposure levels, and it also worsens asthma and arthritic conditions. Due to the high silica content of the dust produced by gold mining activities, silico-tuberculosis has been reported in the mining region (Akabzaa & Darimani, 2001). Some of the reasons why small-scale mining has an adverse effect on the atmosphere is the discharge of dust during digging and the removal of vegetation. As a result, Hilson (2002) called for the use of retorts when miners were seen recklessly burning amalgam and endangering the immediate environment. In mining towns, high-pitched noise is known to create cracks in buildings, harm to the auditory system, tension, and discomfort in both humans and animals (Akabzaa & Darimani, 2001). The noise also has a negative impact on the animal population because it scares animals, which prevents them from reproducing and results in abortions.

There have also been reports that illegal mining compromises people's personal security. Poor safety conditions and unrestricted land digging at illegal mining enterprises have contributed to the deaths of numerous miners in Ghana (Jamasmie, 2013). According to Adjei et al. (2012), over 100 miners perished on June 27, 2010, when a *galamsey* pit collapsed close to the Ofin River at Dunkwa-on-Offin in the Central Region. A rescue effort was launched to recover the dead,

but it was only able to recover 13 because of the Ofin River's overflowing waters (Basu et al., 2015). Attaso in the Ashanti Region, close to Kotokuom, saw a similar tragedy. In this incident, more than 12 *galamsey* operators were trapped in a collapsed pit, but only 9 of the bodies were recovered from the pit ("The Galamsey Threat," 2011).

Sixteen *galamsey* employees, including two women, were killed at Kyekyewere, close to Dunkwa, according to the Ghana News Agency (Seventeen galamsey operators crush to death at Kyekyewere, 2013). They were thought to have disregarded instructions to keep away from a mine site that was being cleaned up.

There are two basic ways that mining activities contribute to water pollution. First, because processing ore requires a lot of water, mining has an impact on fresh water. Second, when mining waste is discharged into the water ("Mining reform and the World Bank: Providing a policy framework for development," 2003), water becomes contaminated. Mining naturally eliminates water resources, redirects them, and may do undesirable things to them by polluting them (Safe Drinking Water Foundation, 2017).

It has come to light that mining operations have severely harmed the municipality of Obuasi's water resources, including streams, rivers, and other bodies of water. These water sources have either dried up or become chemically contaminated (OMAMTDP, 2006; Yeboah, 2008). Yeboah (2008) claims that there currently is no fishery in the Kwabrafo River due to the annihilation of every kind of fish brought on by toxicity. Complaints are also levelled at the

maintenance of wells and the quality of water that emerges from them. Similar to Sanso and Abompe, water from boreholes there has been tainted by pollutants from below.

Water banks have also been destroyed as a result of mining activity. This is due to the fact that small-scale miners frequently work beside rivers, damaging the banks and making rivers more likely to overflow during periods of high precipitation. As a result, mining villages have experienced flooding ("The galamsey threat," 2011), which has caused the loss of both property and human life. In addition, to make room for mining operations, the natural courses of the majority of rivers and streams are changed or blocked. For instance, Kusi-Ampofo and Boachie-Yiadom (2012) stated that mining operations along Tarkwa's river have significantly altered the river's natural course. Additionally, it was noted that the river is dark brown in colour, which was not previously the case. This is because, according to information showed by Kusi-Ampofo and Boachie-Yiadom (2012), growers used to drink river water untreated in the years prior to illegal mining activities along the river.

In addition, as mentioned by Boachie-Yiadom (2010), the contamination of the water bodies has caused an increase in turbidity, which has resulted in a drop in the pH of river water, which produces a number of hydrological responses, such as the dissolving of metal oxides. Oxides of various metals that enter the water quickly dissolve in it due to the constant decline in pH levels of the water bodies. Armah, Luginaah, and Obiri (2012) examined the dangers of human being exposed to hazardous substances in the Tarkwa, Ghana. According

to the study, inhabitants' bloodstreams and serum levels spiked as a result of swallowing and being exposed via the skin to dirt, water, and sediment samples.

Some water bodies have been especially affected by exposure to mining activities. Water from the Ankobra, Pra, Birim, and other water sources, upon which several towns depend, has reportedly been severely polluted, according to Emmanuel (2013). As a result, the communities are unable to rely on them. Mining operations, in particular illegal ones, raise the expense of water purification for water firms that purify the drinking water for the general population. Given the seriousness of the contamination, the quantity of detergents required for purifying the water may degrade the standard of the water supplied to the general public, forcing water providers to stop operating.

Research by Cobbina et al. (2013) found that sampled water obtained from potable water supplies in Datuku, in the Talensi-Nabdam District, varied in turbidity. Absolute allowable values for water consumption purity were set by the World Health Organisation (WHO) in 2008; nonetheless, the mean concentration of sediment at each testing point exceeded those limits. Runoff and waste water from the gold mining industry were to blame for the extreme turbidity in the surface water. Turbidity in ground water may be caused by chemical particulates created by the decay of rocks. The analysis also revealed that the water samples' electrical properties varied. This is brought on by dissolved minerals in the water brought on by adjacent mining operations. Mihaye (2013) stated in a similar manner that small-scale mining seriously harms water systems in the East Akim municipality. Humans, fish, and other aquatic creatures are seriously at risk due to

the emission of toxic chemicals employed by the miners, such as cyanide and mercury.

According to Standing and Hilson (2013), while gold mining in Ghana boosts the country's overall economy on a national scale, each region's locals contend with an assortment of ecological and social issues like the disappearance of agriculture. First, heavy machinery used to remove soil cover diminishes the soil of nourishment, rendering it barren for cultivation. Rocks and other mining-related debris were present in some Sanso locations (Yaboah, 2008). Pits are also created as a consequence of mineral extraction, rendering these sites unreachable to the local community due to the risks that they present. This problem was observed in the field at Anyinam and Binsere by Akabzaa and Darimani (2001). Even after being backfilled, these pits either turned into dams for tailings where waste and other potentially dangerous materials were thrown away.

Awudi (2002) has noted land degradation in Tarkwa, where extensive excavation has completely altered the ground's suitability for farming and other forms of subsistence activity. In Kenyasi, where the local mining company has planned to mine a significant section of arable and farmland in the future, Opoku-Ware (2010) also noted land degradation brought on by Newmont Company's mining operations. Farmland was lost as a result. In addition, Newmont has dug three important pits, and huge parts of the land are covered in piles of sand that can't be used for anything else. Some areas of Kenya suffer from significant land degradation, and unauthorised gold miners are indiscriminately extracting the metal. Opoku-Ware added that the operations of the miners lead to the

degradation of land resources because they are not supported by any expert evaluation of the gold-bearing rocks and land. Despite this, locals frequently turn to unlawful mining to make up for lost land because of this concessionary approach.

There have also been reports of land losses due to mining in other regions. Mining operations in the Tarkwa, Bogoso/Prestea, and Damang have resulted in the loss of about 25% of the farmland. Future mining operations could result in additional land losses (Ayensu-Ntim, 2015). This supports the findings of a previous study by Duncan et al. (2009) that found that agricultural land is disappearing at concessions as mining-related activities rise. Between 1986 and 2006, they discovered a 15.45% decline in the amount of agricultural land used. This was as a result of the conversion of 325.83 hectares for mining operations and 335.71 hectares into other land uses, such as communities and highways, to support mining operations.

Amponsah-Tawiah and Dartey-Baah (2011) also mentioned how mining operations have a negative impact on agricultural productivity. As they stated, domestic food production in the Obuasi municipality is insufficient to meet the demands of the entire region. This is due to the fact that cropland in the region has either been degraded or set aside for mining operations. Heavy machinery used to dig for gold resources has caused land degradation by removing top soils, trees, and vegetation. As a result, the land is no longer suitable for farming. Only a small amount of farmland has been left for farming.

According to Kuemmerle et al. (2011), displaced farmers typically find new land via renting land or chopping down surrounding trees. Farmers may experience negative effects on their landholding status, farm size, and production even when they are able to purchase alternative land. Farmers who were once landowners may find themselves in situations where they are forced to cultivate smaller farmlands as renters (Reisenberger, 2010). Farmers in the Teberebie village find it challenging to get to their farms because of the waste rock dump that is encroaching on farmlands. To get to their farms, some farmers had to travel as far as 9 miles on foot. A 9 kilometre walk was required for some farmers to reach their properties. Taxis are another option for those who cannot afford public transportation; however, due to the expense of the trip, they are only used occasionally (OMAMTDP, 2006). This conclusion was supported by (Reisenberger, 2010), whose study on the effects of the Chirano gold mines on neighboring villages found that the company's operations restricted access to the farmers' farms, making it challenging for farmers to get farm products to their houses. Due to fatigue and a shorter amount of time to work on the land, traveling a great distance to reach farmland might impair a farmer's production (Darko, 2012; World Bank, 2007).

Ghana's mining industry has been linked to air pollution. The primary source of air pollution in the Kenyasi community is the dirty, rough roads that Newmont's large trucks routinely traverse to transport equipment to the mines (Opoku-Ware, 2010). Chemical gases, emissions, and combustion are difficult to see at the mining location, but when blowing occurs, dust briefly dominates the

atmosphere. Although Newmont has addressed complaints about the air pollution caused by dust and untarred roads by sporadically misting the roads with water, this is not done frequently. Dust has also been linked to the development of respiratory illnesses and disorders, as well as the aggravation of asthma and bronchial stiffness in susceptible individuals (Akabzaa & Darimani, 2011).

In recent times, mining operations have been linked to noise pollution in Ghanaian communities (Opoku-Ware, 2010). Despite the fact that most businesses that utilise heavy equipment are required to adhere to defined criteria for noise pollution and that machinery noise emission levels are regularly reviewed, the issue is not resolved because little noise originates from the Newmont plant site. The mining facility's explosion is the main cause of nuisance noise in the surrounding area. Structures in Kenyan communities are routinely shaken by the vibrations, and the majority of them have noticeable fractures (Opoku-Ware, 2010). In addition, noise from large vehicles owned by the Newmont Company adds to the noise pollution in Kenyasi. Given that this traffic is continual, it is even more dangerous than the blast noise.

Mining processes and equipment are likely to expose nearby communities to noise. Noise is, for instance, produced in the excavation process, through the use of dynamite and (to a lesser extent) shovels and picks (Basu et al., 2015). Similar to this, grinding ore using generator power can expose workers to high levels of noise, whereas grinding ore by hand with a mortar and pestle is likely to expose workers to lower levels of noise. 59 workers (23%) with noise-induced hearing loss were identified in Amedofu's (2002) study of 252 miners at a large-

scale gold mining operation in Ghana. Research by Saunders et al. (2013) that found that 21 (35%) of 59 people in a mining town in Nicaragua experienced hearing loss due to noise supports this.

According to Amankwaa's (2016) study of quarry centres, three out of five firms reported an average threshold for hearing level of higher than 25 dB, which is in line with the findings of Amedofu's (2002) and Saunders et al.'s (2013) findings. Hearing impairment caused by noise was noted by more than 25% of those polled at these companies. The kind and amount of noise-generating machinery employed in the different quarries may be the cause of the strong connection between the threshold for hearing level and the different working settings. According to analysis of respondents with hearing threshold levels over 25 dB, 75%, 18%, 5%, and 2%, respectively, had mild, moderate, moderately severe, and severe hearing loss. This study demonstrates the necessity for implementing suitable interventions to reduce this risk by highlighting the high occurrence of ear injury among employees in highly noisy locations, such as quarries.

In all, as the review in this section reveals, studies have been conducted on various aspects of human security, such as economic security, health security, environmental security, and personal security. In terms of economic security, studies have reported that as a result of illegal mining, farmers lose their farmlands. As a result, they lose their means of livelihood, thus affecting their economic security. It has also been revealed that diseases usually outbreak in mining areas, and this affects the health security of both the workers and

inhabitants of surrounding communities. The environment also suffers from mining activities, especially through environmental degradation, pollution of water bodies and the air, etc. A lot of people have also died in pits as a result of illegal mining activities, with their personal security affected. However, none of these studies was conducted in the Atiwa Forest, highlighting the need for the present study.

Mining and Conflicts

This section examines previous studies on conflict in mining areas. Generally, most of such studies were conducted outside Ghana. Numerous studies have specifically examined mining-related conflicts in Peru. According to Oxfam America (2009), neighborhood violence is a result of inadequate funding for municipal governments, based on economic expansion statistics and past accounts of social tensions associated with mining. The mine's proximity to various villages has not enhanced their quality of life, but it has boosted their economy.

The findings of Oxfam America (2009) are in line with those of Bebbington and Williams (2008), who predicted that mining has a negative impact on around 50% of Peru's agricultural villages. They claim that several types of violent confrontations are influenced by the quantity and quality of water. Based on these conclusions, the Peruvian government asked Tanaka et al. (2011) to examine the underlying factors contributing to the rise in social disputes in the mining industry. The study came to the conclusion that social and environmental issues are the most typical source of conflict through case analysis. It was also discovered that the issue was brought on by varying interpretations of what

"development" and "effective land use" meant. For farmers, small-scale farming is an economic activity, a social network, and a feeling of belonging; however, for government agencies and mining firms, the same plot of land is a capital asset that is not currently producing any income.

Additionally, quantitative research has looked into mining-related conflicts. According to Arellano-Yanguas (2011), who used multiple regression analysis with the yearly conflict index as the dependent variable, economic rents are the primary cause of conflict in Peru. With the intensity of local shifts, conflicts rise. Additionally, he discovered that there is a higher chance of conflict when mining firms must seek permission to really extend the extent of their activities and the local community holds the negotiating clout. He thinks that the failure of local governments to make wise investment decisions and effectively allocate resources led to this discovery. He noted that nations like Peru, where there is a low level of integration between the national political authority and the local political authority and the federal government is unable to address issues connected to incorrect rent management, may experience this consequence (Arellano-Yanguas, 2011).

Berman et al. (2017) examined the wars in African nations between 1997 and 2010 at the regional level. They discovered that the primary drivers of conflict are ethnicity and whether mining projects are situated in areas where indigenous peoples reside. Additionally, they discovered that the commodity super cycle of the 2000s was rife with conflicts. For 640 mining projects spread across five Latin American nations, Haslam and Tanimoune (2016) conducted a

micro-level statistical study. They discover that there is a high correlation between conflict and state and foreign ownership, open-pit mining, and mine altitude. They provide an explanation for these results by emphasising the limited alternatives to agricultural output that exist at high altitudes, which intensifies the struggle between mining and agriculture.

In a study conducted in Ghana, Twerefou et al. (2017) evaluated mining disputes there using survey data. They discovered that the amount of pollution raised the risk of conflict by 7.1% when it was utilised as an explanatory variable. Moreover, they discovered that conflict was less likely to occur when primary education was improved, employment options were expanded, the system was strengthened, and there were no small-scale miners, which decreased conflict likelihood by 12.8%, 35.8%, 6.57%, and 17.7%, respectively. Hilson and Yakovleva (2007) also investigated the conflict dynamics in Prestea, Ghana, where a local *galamsey* mining firm operated unlawfully under a license issued to Bogoso Gold Limited (BGL), a subsidiary of Gold Star Resources, a publicly traded international corporation with operations in Canada. Similar to the rest of the mineral-rich sub-Saharan Africa, it was discovered that the war in Prestea was largely brought on by the national mining sector reform plan, which gave priority to the growth of large-scale operations mostly under the authority of foreign nations and disregarded the concerns of indigenous peoples.

Conceptual Framework

The study builds a conceptual framework on the effects of illegal mining on human security. The conceptual framework is built on the theoretical basis of human security. Figure 2 shows the conceptual framework for the study.

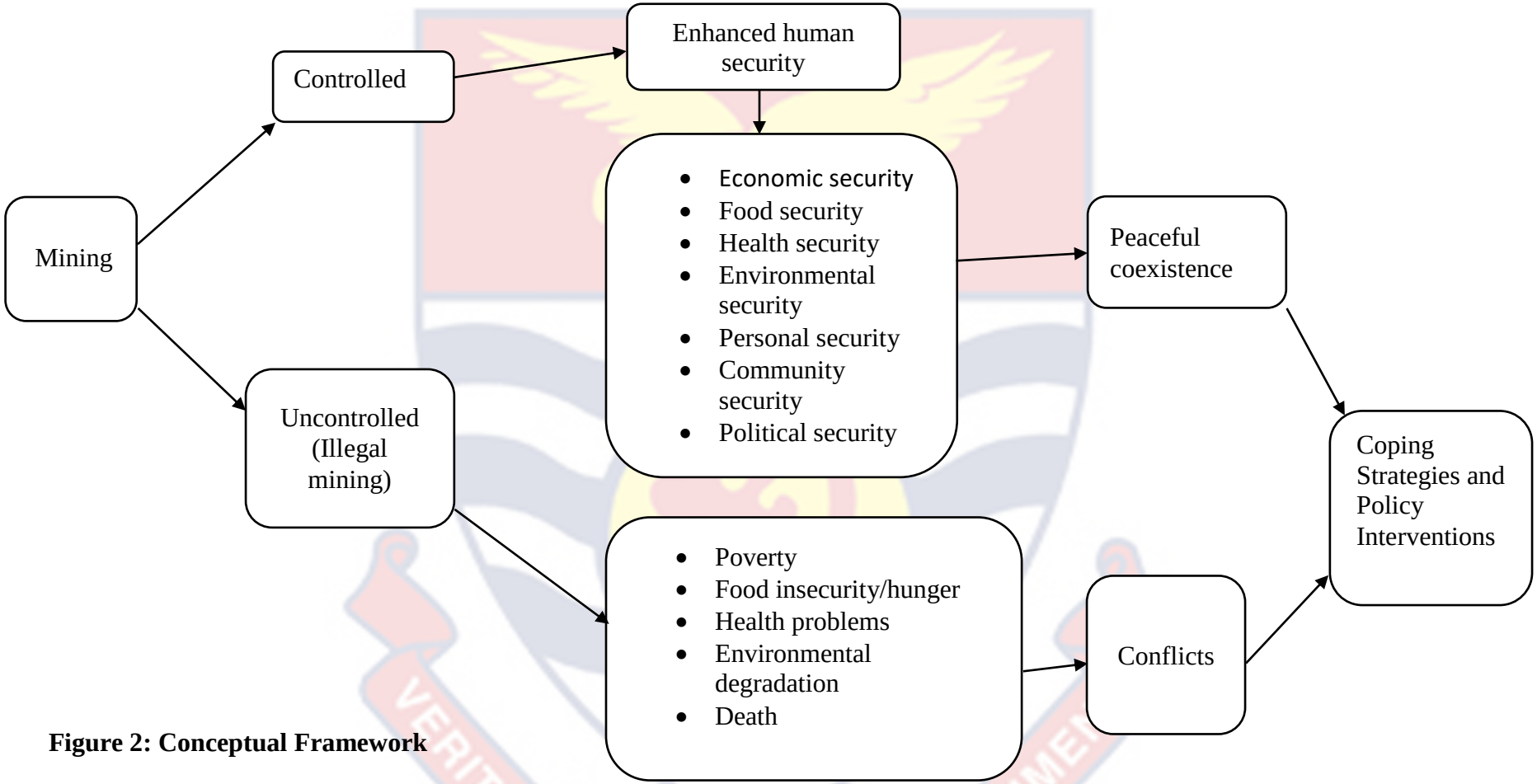

Figure 2: Conceptual Framework

Source: Author's construct (Guided by the existing literature)

As shown in Figure 2, the framework is built on the three theories that guide the study. The figure contains nine inter-related components. The relationship that exists between these variables is represented by the arrows.

Mineral resources represent the proposition of the resource curse theory that the existence of natural resources comes with a curse which is evident in underdevelopment and conflicts. In other words, it is argued that the existence of mineral resources in the Atiwa Forest lead to poor socio-economic outcomes in the surrounding communities (Chekouri et al., 2017). In an attempt to exploit the mineral resources, miners' resort to either controlled (legal) mining or illegal mining. Controlled mining leads to enhanced human development evident in positive human security implications such as economic security, food security, health security, environmental security, personal security, community security and political security, as well as peaceful coexistence.

On the other hand, uncontrolled illegal mining, which is the focus of the present study, results in negative human security implications on people. As the figure shows, illegal mining affects the seven components of human security (economic, food, health, environmental, personal, community, and political security). In terms of economic security, illegal mining can lead to poverty. Concerning food security, illegal mining can result in hunger due to extreme climate change and agricultural change. Illegal mining also affects the health security of people. It leads to diseases such as malaria, diarrhoea, upper respiratory tract infections, skin disease, and acute conjunctivitis (Awudi, 2002). Illegal mining in the Atiwa Forest may also affect the environmental security of the inhabitants of the Atiwa community. In this regard, illegal mining may lead to

land degradation, air pollution, water pollution, noise pollution, etc. (Opoku-Ware, 2010).

As regards personal security, illegal mining may result in conflicts, natural disasters, and hazards (Bannock Consulting Limited, 2005). Illegal mining may also affect community security in that it may lead to violations of the integrity of cultures etc. The effects of illegal mining in the Atiwa Forest may also be evident in political repression, and vulnerability to conflicts and warfare.

The people may also adopt coping strategies to mitigate the effects of the mining activities on their human security. The problem of illegal mining also needs redress from stakeholders such as the government and other non-governmental organisations. In this regard, the stakeholders will institute policy interventions to solve the *galamsey* problem in Atiwa Forest Reserve. Thus, the conceptual framework focuses on the human security implications of illegal mining, conflict in illegal mining communities, coping strategies, and policy interventions.

Chapter Summary

This chapter has discussed the literature related to the present study. In this chapter, three theoretical frameworks have been discussed, indicating their applicability to the present study. These theories include the theories of human security, Maslow's theory of needs and resource curse. Again, the chapter discussed the history of mining in Ghana, conflict in mining areas, and effects of illegal mining. From the theoretical, conceptual, and empirical literature, a conceptual framework was developed to guide the study. In the next chapter, I present the methodological considerations involved in the study.

CHAPTER THREE

METHODOLOGY

Introduction

In the previous chapter, I discussed pertinent literature related to the study. In this chapter, I focus on methodological issues involved in the study. The chapter, thus, discusses issues pertaining to the research design adopted in the study, study area, and study population. Other issues discussed include sampling procedure, sampling size, data collection procedure and instruments, as well as the data processing and analysis.

Research Philosophy

This study is anchored in the constructivism According to social constructivists, each person gives their life a unique, and complex significance (Mertens, 2019). As a result of this ideological stance, the goal of a study is to depend as much as practicable on the subjects' impressions of the issue being studied. Interaction with others (thus social constructivism) and socio-historical norms that influence the way individuals conduct their daily lives help to form the meanings. Constructivist scholars focus on the local setting of the people and demonstrate how their perspective is impacted by their prior experiences so as to understand these socio-historical contexts. The goal of an investigator is to make meaning of (or understand) the viewpoints of others of their surroundings (Creswell & Creswell, 2018). In the study, the constructionist philosophy is a suitable choice since it helps to examine the human security ramifications of illegal mining in the study area.

Research Approach

The study adopted qualitative research design, because of the nature of the study. This design made a case for curiosity about how people perceive social reality (Creswell, 2014; Denscombe, 2008), with regard to the human security implications of illegal mining activities, focusing specifically on the Atiwa Forest. When gathering and analysing data from participants, qualitative research methodologies call for the incorporation of perspectives and language (Denscombe, 2008). In the search for insight into the social sciences, qualitative research techniques are becoming popular.

Despite the fact that there have been many articles written over the years about qualitative approaches, Bryman and Cramer (2004) caution that it might be difficult to define what they are and are not as a specific research strategy. Creswell (2014) asserts that qualitative research places a greater emphasis on the subjective aspect of inquiries and places the investigation in the social, cultural, and political environment of the investigators, those who participated, and the study's readership. Creswell added that the qualitative researcher collects information in the actual environment where the relevant phenomenon occurs. The qualitative approach is deals with situations that are primarily social phenomena, as in this case with the *galamsey* issue in the Atiwa Forest.

Research Design

The case study design was used in the investigation Creswell (2016) claim that the case study approach can be used in a variety of sectors where the researcher conducts an in-depth examination of a case involving a program, event,

activity, process, or one or more individuals. Case studies are examined in the context of real-world events; for researchers, it is frequently crucial to comprehend how the case affects and is affected by its surroundings. The results of a case study, however, cannot be specifically generalized.

Study Area

The study region is in Ghana's Eastern Region's East Akim Municipality. Within a semi-deciduous forest area, the forest reserve is located. According to Lindsell et al. (2019), the forest reserve has an area of 263 km^2. Although most of the region is undulating, there are some places that reach up to 300 m above sea level. Again, the forest region is in the west semi-equatorial zone, which has two distinct rainy seasons. May to June is when the first one begins, whereas September to October is when the second one does (Ghana Statistical Service, 2010). Between 125 and 175 mm of rain fall per year is the average. A dry season follows the wet ones and begins in November and lasts until late February. The majority of the rain-fed farming activities are supported by these weather dynamics, which also promote plant development outside the forest reserve. Due to the fact that around 65% of the population is engaged in farming, farming is the main economic activity in the East Akim municipality. Farmers produce key income crops like cocoa and coffee in addition to a variety of staple foods like cassava, maize, plantains, oil palm, and bananas (GSS, 2013). At the edges of the forest, some notable towns or localities include Kyebi, Amafrom, Sagyimase, Ankwadum, Kibi, and Adadetem.

The regional capital Koforidua is 55 kilometers away from the municipal capital of Kibi, and Accra, Ghana's capital, is 105 kilometers away. The Municipality is bordered by the districts of Kwaebibirem, Atiwa, New Juabeng, Suhum-Kraboa Coaltar, and Yilo Krobo. Its 950 km^2 is divided into six sub-municipalities: Tafo, Kibi, Apedwa, Asafo, Bunso, and Asiakwa (Opare et al., 2012).

The East Akim Municipal Assembly had a total population of 167,896 people, or 6.4% of the region's total population, according to Ghana's 2010 population and housing census with 229.4 people per hector square kilometer live in the Municipal Assembly. There are 67,828 rural residents and 100,068 urban residents in the region. The Municipal Assembly is made up of 164,568 members from 42,093 households, which make up the municipality. According to the municipality's 2010 Population and Housing Census, there were 86,129 women and 81,768 men (GSS, 2010).

One of the two highland evergreen forest types in Ghana is the Atiwa Forest, the subject of the current study. Atiwa is situated in the Moist Semi-Deciduous Forest zone. It has been designated as a "Globally Significant Biodiversity Area (GSBA) and an Important Bird Area (IBA)" since it was formed and gazetted as a forest reserve in 1926. Plateaus give Atiwa its distinctive look as it extends from the north to the south ((Owusu-Prempeh et al., 2022).

Atiwa is home to a variety of rare and threatened species of plants and animals. The mountains of Atiwa are the source of three rivers (the Ayensu, Densu, and Birim), which provide water to businesses, farms, and the bulk of the

residents of the Eastern and Great Accra Regions (including the capital Accra). The environmental conditions of Ghana's eastern and neighboring regions is significantly impacted by Atiwa. It has a great deal of potential for tourism and is aesthetically pleasing (Owusu-Prempeh et al., 2022). The study aims to evaluate the consequences of illicit small-scale mining that has been drawn to the region's gold and bauxite ore reserves.

Figure 1: Map of Atiwa Forest showing the surrounding communities

Source: Ghana Geological Service Authority (GGSA, 2016)

Study Population

Given that the study area has several communities, it was important to select some for the study since focusing on all the communities was not feasible, given the limited time-frame of the study. In settling on the communities for the study, I sought the opinions of the Forestry Commission, since they are in charge of the forest and know which areas need attention. Upon my interview with members of the Commission, they advised me to focus on the Kibi, Adadetem, and Ankwadum communities since these communities are very close to the forest and are likely to experience the impact of the illegal mining activities.

The study purposively selected regulatory bodies for interviews. Purposive sampling, also known as judgment sampling, is the deliberate selection of an informant based on the attributes the informant possesses, claims Tongco (2007). According to Bernard (2002), it is a method where the researcher identifies what information is necessary to have and then searches for sources who are eager to share it because of their familiarity with or expertise with the topic at hand. According to Guest, Bunce, and Johnson (2006), six interviews could generate enough major concepts and meanings for a qualitative study. Broadly, 23 community members were conveniently sampled and engaged through focus group discussion.

In addition, two officers of the Forestry Commission, two officers of the District Assembly, three members of the security service (one each from Divisional Police, Community Mining Task Force, and District Police), and one member of the Mineral Commission were sampled. The responders were chosen

based on their depth of understanding of the topic under examination. For example, the traditional leaders were chosen based on how well they maintained the welfare of the residents in their towns. Table 1 shows a breakdown of the sample:

Sample and Sampling Procedures

The study used non-probability sampling method to sample the target participants. Specifically, the convenient sampling techniques was used to select the community members while the regulatory bodies were sampled purposively. After doing the necessary gatekeeping, we selected the community members who consented to take part in the study. The interview was conducted to the point where the issues were repetitive, leading saturation point. Per the nature of the study, the aforementioned sampling techniques were appropriate to gather the relevant data for my research questions.

Table 1: Population and Sample

Sample Unit	Number
Community members	23
Forestry Commission	2
District Assembly	2
Divisional Police	1
Community Mining Task	1
District Police	1
Mineral Commission	1
Total	31

Data Collection Instrument

The data were collected using an interview guide. According to Denzin and Lincoln (2018), interviews have become a very important mode of collecting qualitative data in the human social sciences. Interview may be relatively structured, unstructured, or semi-structured. The study used a semi-structured approach for data collection. A semi-structured interview is an interview with a goal of collecting accounts of the interviewee's life world in order to decipher the significance of the reported facts (Brinkmann & Kvale, 2015). The fundamental benefit of a semi-structured interview is that it frees up the interviewer's knowledge-producing capacity, allowing them to pursue whatever aspects they feel the interviewee finds particularly salient. As a result, the semi-structured interview used in the study gives respondents complete discretion to act anyway they like within a wide range of parameters. All facets of illegal mining, including questions about the way it is conducted, how land is acquired, the implications both good and bad as well as potential conflicts and coping mechanisms. Largely, the instrument covered all the specific objectives.

Data Collection Procedure

Before the actual data collection, the researcher sought ethical clearance from the Institutional Review Board (IRB) of the University of Cape Coast. Additionally, an introduction letter was sought from the Department of Peace Studies. With this, the researcher went to the three communities, contacted the traditional leaders, and made his intension known to them. Similar contacts were made with the Mineral Commission as well as the other institutions involved in

the study. After this contact, the researcher scheduled interview sessions with the sampled individuals at their convenience. Before each interview, the respondents were made to sign a consent form and they were assured of confidentiality and anonymity. Some of the interviews were conducted in English and recorded. However, most of the community members who were not fluent in English were interviewed in Twi.

Data Processing and Analysis

Data collected was first transcribed, proofread, and prepared for analysis. The interviews conducted in Twi were translated to English for easy analysis. The data was analysed using reflexive thematic analysis. With this, the transcriptions were read twice to ensure familiarity with the data. Themes were generated and grouped according to the research questions. I debriefed my peers whenever I encountered difficulties. This was to ensure validity and reliability of the findings.

Ethical Issues

The researcher obtained an introduction letter and ethical approval from the Institutional Review Board (IRB) of the University of Cape Coast prior to the data gathering exercise. By doing this, it will be ensured that respondents' moral rights are upheld (Bless & Higson-Smith, 2000).

In essence, participants should not be required to participate in research; rather, they should be able to withdraw from the study at any time (Babbie & Mouton, 2001; Bless & Higson-Smith, 2000). No participant will be forced to take part in the proposed study in this regard. In fact, individuals will be able to choose whether or not to take part in the study. As a result, any participant who

wishes to withdraw from the study may do so. A consent form was signed by participants before they took part in the study. In order to assure their willing participation in the study.

The researcher ensured that research participants maintain their anonymity and confidentiality. Participants in the study were essentially given the guarantee that any information they provided would be utilised only for research purposes and that their names will be kept secret. To that effect, pseudonyms were used as the respondents' identities, the study ideally guaranteed their privacy.

Chapter Summary

This chapter discussed the research philosophy which centred on constructivism. It also discussed the research approach, research design, the study area and the population and sampling. Other issues discussed were the data collection instrument, data collection procedure, data processing and analysis and finally ethical issues. The next chapter will focus on the results and findings.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

The previous chapter presented the methods involved in conducting the study. In the present chapter, the focus is on the presentation of results and discussion. This is done according to the research questions. Thus, the chapter, first, examines the implications of illegal mining on the livelihoods of people around the Atiwa Forest. Second, it examines the conflicts that arise from the illegal mining activities. Third, it looks at the coping strategies adopted by the people to offset the challenges associated with illegal mining. Then, it looks at the capacity of the regulatory bodies in charge of fighting illegal mining in Ghana. Finally, it looks at recommendations to help control illegal mining in the study area.

The Implications of Illegal Mining on the Livelihoods of People Around the Atiwa Forest

The first specific objective of the study sought to assess the implication of illegal mining on the livelihood of the people around the Atiwa Forest. The objective was prudent as a result of the effects of the mining activities on the existence of the members of the communities around the Forest. The instrument was designed to capture both positive and negative effects of the mining activities. The community members were the main participant in this regard. As a results issues pertaining to how the mining activities influence the very existence of the participant were deep dive into.

The data gathered from the field revealed that illegal mining had both positive and negative implications on the livelihoods of the people. On the positive side, illegal mining was considered as something which brought jobs to the people. On the other hand, the illegal mining activities affected the water bodies, created food insecurity and health problems, and also affected the air they breathe. The implications were further broken down based on water bodies, food security, health and air.

Environmental security (Water Bodies)

Water constitutes an important aspect of human life. Humans need water to survive. However, because of the illegal mining activities in the study area, water bodies have been affected, rendering them inappropriate for use. As the respondents noted, before the advent of illegal mining activities in the area, the rivers, streams, and other water bodies were clean and could be used for household activities such as drinking and food preparation. However, with the illegal mining, these water bodies have been polluted. In connection with this, a respondent had this to say:

> *For water, it affects it. Except for pipe borne water, other water bodies are affected. For instance, if you go to Birim, the water has become worst. Except for pipe, we have serious water problems* (Community member 4, Kibi, 14th, June, 2022*)*

From the quote above, it is clear that the illegal mining activities have polluted River Birim and other water bodies. For the Birim, the pollution is evident in the

change of its colour. This was supported by the voices of other respondents who also commented on the water problem. One woman said:

> *All water bodies have been destroyed. Our water bodies, Adensu, Birim, Aboafia, Ntwirefia, have all been condemned. The water is destroyed and not good for drinking. Unless you use it to wash* (Community member 1, Adadetem, 15th June, 2022)

Another respondent answered that even the pipe-borne water, alongside the water bodies, has been affected as a result of the mining activities. This means that they can no longer use the pipe-borne water for drinking purposes:

> *Now, Birim has become very dirty. Look at our pipe. Because of gold mining, today, if you fetch water from pipe, the water is destroyed. Unless you buy pure water. How about those who don't have money* (Community member 4, Adadetem, 15th June, 2022)

Some raised concerns that the water now appears as though it flows in a gutter. This means that it cannot be used for any household activity, such as drinking cooking or washing. Here are the observations of two respondents who mentioned it:

> *For the water, they have destroyed it. Water that we use for cooking and drinking, you go and realise that it is like gutter water. So as for water, we don't get some to drink (*Community member 2, Adadetem, 15th June, 2022).
>
> *At first, we used to drink Birim, but now, we drink sachet water. All the water is spoilt. … even if you're asked to use it to wash your pants, you*

will refuse. It is polluted. It has become as red as gutter water. …. At first the water was here, when you get there, you could bath. It was so clean and white. It contained gravels and crabs. It contained a lot of fish. Today, all the water has become muddy. If you fall into it and you're not careful, you cannot come out (Community member 7, Kibi, 14th June, 2022)

As can be seen from these narratives, it is clear that the mining activities have affected the water sources of the people. Apart from the fact that the water cannot be used for cooking, drinking and washing, the muddy nature of the water poses an additional risk to human lives. Thus, when someone get into the river, that person is at risk of getting drowned.

It is clear from the quotes above that illegal mining has negative implications for water security at the study area, which, in turn, affects the human security of the residents in various ways. For instance, good sanitation conditions are necessary for health security, a crucial component of human security. Water security is conditioned by these considerations for health security. The proper protection of people from waterborne disease is crucial for both health and water security. Water security, therefore, has a direct impact on health security. The aforementioned implication of the illegal mining is in consonance with the finding of Qureshi, (2021) who established that water security crucial for human security because health security is a requirement for human security.

The impact of illegal mining on water quality, as revealed in the present study, accords with the findings of some previous studies. For example, a study by Schueler et al. (2011) in mining areas in Western Ghana reported that surface

mining resulted in water contamination, which negatively affected the livelihoods of the people. Similarly, Cobbina (2013), whose study focused on Talensi-Nabdam District of northern Ghana, found high concentration of trace metals, rendering the water unsafe for human consumption.

The results of the current study further corroborate Offei-Aboagye et al.'s (2004) conclusion that the effects of illegal mining on environmental security have a direct impact on water bodies. River and stream pollution from small-scale mining is severe. Due to the use of suction dredges and hydraulic pumps, which can occasionally alter the landscape, small-scale mining operations contribute to the sedimentation of rivers. Others contaminate rivers with harmful substances, rendering them unfit for human consumption.

There are two basic ways that mining activities pollute the water. First, because processing ore requires a lot of water, mining has an impact on fresh water. Second, when mining waste is discharged into the water ("Mining reform and the World Bank: providing a policy framework for development," 2003), water becomes contaminated. By its very nature, mining depletes, diverts, and potentially dangerously pollutes water supplies (Safe Drinking Water Foundation, 2017). Acid mine drainage, heavy metal contamination and leaching, processing chemical pollution, erosion, and sedimentation are the four main ways that mining affects water quality (Safe Drinking Water Foundation, 2017).

The water resources in Obuasi Municipality, including streams, rivers, and other water bodies, have been severely harmed by mining activities, according to Yeboah (2008), who also revealed similar findings to the current study. These

water sources have either dried up or been chemically contaminated. Additionally, there have been grievances concerning borehole water quality and maintenance. Similarly, water from boreholes at Sanso and Abompe has been contaminated by underground chemicals.

The present study's respondents found that illicit mining activities have changed the color of the water bodies. This supports the findings of Kusi-Ampofo and Boachie-Yiadom (2012), who stated that because of illicit the mining operations around the river, the river is now dark brown in color, which was not the case in the past. It was discovered that in the years prior to illicit mining operations along the river, farmers used to drink the river water directly without treatment because of its clear color (Kusi-Ampofo & Boachie-Yiadom, 2012).

The results support Emmanuel's (2013) conclusion that water from many communities' main sources has been severely contaminated. As a result, the communities are no longer able to rely on them as a source of drinking water. Mining operations, particularly unlawful ones, have an impact on the quality of the water and raise the cost of water treatment for water corporations that process the water for the general public. Due to the severity of the water pollution, it takes a lot of chemicals to treat the water, which could then lower the quality of the water that is provided to the general people. This could be the reason why the research area's pipe-borne water, as indicated by the respondents, has poor quality.

Mihaye (2013) stated in a similar manner that small-scale mining seriously harms water systems. Humans, fish, and other aquatic creatures are in grave

danger due to the emission of toxic compounds used by the miners, such as mercury and cyanide. This is consistent with the study's findings, which showed that respondents believed that illicit mining activities had decreased the number of fish and crabs in the water bodies.

Food Security

Apart from water-related issues, the respondents also noted the effects of illegal mining on food security. Some noted that due to illegal mining, the able-bodied men deserted farming activities. This led to shortage of food as there is shortage of labour to work on the farms. In relation to this, a community member had this to say:

> *Because all the boys went into gallamsey, there was no one to engage in agriculture. And also, close lands for faming crops like cassava, maize, yam was dug and destroyed. You cannot go and farm these crops on a distant land, because transporting them home is costly. So, it was difficult to get food (*Community member *15*, Adadetem, 15th June, 2022*)*

Akabzaa and Darimani (2001) noticed that, in many parts of Tarkwa, the environment is going through horrible circumstances and its colossal economic worth is waning from one year to another, due predominantly to the uncontrolled mining activities. Lands for agriculture are by and large debased. Due of land insufficiency, the traditional bush fallow system, which effectively makes land productive, cannot currently be used. The majority of the time, large-scale mining operations continue to destroy the region's vegetation to an extent that is terrible for biological diversity. In addition, the deforestation caused by illegal mining has

long-term effects when new trees are planted and the old dirt is replaced once the mine is shut down (Akabzaa & Darimani, 2001).

According to Standing and Hilson (2013), while gold mining in Ghana helps the overall economy, individual communities are confronted with various social and natural issues, including the obliteration of farmland. It has been uncovered that, in the Obuasi Municipality, one significant impact of surface mining is land debasement. Yeboah makes a similar observation at Sanso (Yaboah, 2008). Another respondent noted that food scarcity resulted from the destruction of food crops in an attempt to clear the land for mining activities. She specifically noted that cassava farms were destroyed with big mining machines:

> *For cassava, it is scarce even today. Because of mining, they had to uproot the cassava and mine there. They also use the big machines to destroy cassava farms. So, it has brought hunger here. (*Community member 9, Kibi, 15th June, 2022*)*

The land debasement at Tarkwa was likewise seen by Awudi (2002) as resulting from the tremendous excavation. Land debasement coming about because of mining exercises of Newmont Company was likewise seen by Opoku-Ware (2010) at Kenyasi. This brought about loss of farm lands. The participants noted that the food insecurity is as a result of the destruction of the land. They noted that because of this, the land has been rendered unproductive. Relatedly, farm lands that were close to human settlements were destroyed, and because of the difficulty involved in cultivating distant lands, people are discouraged from engaging in agriculture. In that regard, the community members have this to say:

*Yes, the land that we use to farm, cultivate cassava, has been destroyed. So, it is difficult to get food. (*Community member 16, Adadetem, 15th June, 2022*)*

*Because of the digging of the land, some refilled the land; others did not and it rendered the land uncultivable. Because of this, food became relatively scarce (*Community member 10, Adadetem, 15th June, 2022*)*

*At first, when you get here, you would not have to go to a distance before getting cassava and plantain. Even at night, you can get food. Now, the close lands that we can use for maize farming, where is it? Where is it? Today, if care is not taken, in the future, we may have to import food from abroad (*Community member 2, Adadetem, 15th June, 2022*)*

*Because all the land has been destroyed, there is no food (*Community member 12, Kibi 15th June, 2022*).*

Land losses to mining activities have been accounted for in different regions as well. In Bogoso/Prestea and Damang, the loss of farming areas because of mining exercises is assessed at 4,935 hectares (Ayensu-Ntim, 2015). This affirms the discoveries of a prior study by Duncan et al. (2009) which noted diminishing farming areas as mining-related. They found that horticultural land use diminished by 661.54 hectares somewhere in the range of 1986 and 2006. This was because of the transformation of 325.83 hectares for mining exercises.

Land debasement has come about because of the evacuation of top soils, trees, and vegetation with large equipment. This has delivered the land barren for agrarian purposes. This has left only a little farmland for cultivating exercises, a

lot of which has been defiled with synthetics from mining exercises. Likewise, cyanide and arsenic are available in land utilised for cultivating because of mining exercises (surface mining).

In mining villages in Ghana, damage to the lithosphere includes the eradication of rural land parcels that trigger soil disintegration. In addition, trenches are not filled in, and recently planted areas are degraded (Donkor et al., 2006). It is challenging for farmers to reach their farms in the Teberebie neighbourhood because of the waste rock dump that is eating farmlands. A 9-kilometre walk was required for some farmers to reach their properties. Others that can afford it take a taxi to get to their farms, although they only do this once or twice a week due to transportation costs.

> *They dug deep pits around the water bodies. Had it not been for gallamsey, you can plant some cassava or plantain for it to grow well. Now, you can't cultivate plantain or cassava because the land is not productive. (*Community member 4, Adadetem, 15th June, 2022*)*

Another problem is that pits that are created render farm lands inaccessible to farmers. Field observations by Akabzaa and Darimani (2001) affirmed this issue at Anyinam and Binsere, as pits with profundities going from 50-75 m were left there by mining exercises. Indeed, even where such pits were refilled, they were either covered with rocks (which delivers the land barren) or changed over into tailings dams where waste and other poisonous materials are unloaded.

This conclusion was supported by Reisenberger's (2010) study on the effects of the Chirano gold mines on the local community, which found that the

business's activities restricted access to the growers' crops, making it challenging for farmers to get their harvest to their homes. Long travel lengths to farms might diminish farmers' production since they make them more exhausted and give them less time to cultivate the land (Darko, 2012; World Bank, 2007). This result to food shortage.

Besides, three key pits have been exhumed by Newmont and piles of sand from the pits cover huge areas of land that cannot be utilised for farming. Land degradation is extremely serious in certain communities of Kenyasi. Opoku-Ware furthermore noticed that activities of the miners are not upheld by any expert evaluation of gold-bearing areas and rocks and subsequently their activities bring about the obliteration of land assets.

All these voices establish that illegal mining has created the problem of food insecurity, resulting in hunger. This agrees with the existing literature on the effects of mining on food security, an important aspect of human security (UNDP, 1994). In particular, the literature attributes food insecurity to the depletion of the nutrients in land affected by illegal mining activities. In other words, illegal mining results in land degradation, which renders the land unproductive.

Health security

Health is of the core indicators of human security. The health of the community members influences their livelihood. For instance, unhealthy person cannot engage in any meaningful productive activities. Per the field data analysis, the health of the people is affected by the illegal mining activities. The respondents noted that the work is difficult, so they normally have severe body

pains. Others also noted that they mostly suffer from cough. The quotations below substantiate these claims:

> *Because the work is difficult, we experience body pains a lot. It is very difficult* (Community member 10 Adadetem, 15th June, 2022)
>
> *As for illnesses, it is affecting everyone, especially our waist and knees. (*Community member 5, Adadetem, 15th June, 2022*)*
>
> *For diseases, we have suffered a lot, especially cough (*Community member 24, Adadetem, 15th June, 2022*)*

Some respondents noted that one can get infected by some water organisms. These organisms could penetrate your wounds and create illnesses. In some cases, some get rashes on their legs due to the presence of organisms or impurities in the water they use for the mining activities.

> *The water contains some organisms. If you get a wound, they can enter it (*Community member 4, Adadetem, 15th June, 2022*)*
>
> *The water we use is not good. It contains some organisms. You have rushes on your leg. (*Community member 18, Kibi, 16th June, 2022

Some others noted that the diseases come from the chemicals used in cultivating the land. According to them, because the land has been destroyed, chemicals are now used to cultivate crops, and one could get sick from eating crops produced with such chemicals. Some also noted that stagnant water in mining pits breed mosquitos, and this can serve as a source of malaria:

*Because the lands have been destroyed, people use chemicals for farming and consumption of such foods leads to illnesses (*Community member 4, Adadetem, 15th June, 2022*)*

*The water left in the pits could breed mosquitos (*Community member 19, Adadetem, 15th June, 2022*)*

These findings on the health implications of illegal mining are in line with the findings of some previous studies. A study that conducted on the wellbeing security of individuals is Stephens and Ahern (2001) research, which found that mining is among the most perilous occupations on the planet, with both momentary wounds and long-term effects, for example, tumours and respiratory circumstances like silicosis, asbestosis, and pneumoconiosis which regularly result from exposure to dust. According to them, workers in surface-mining regions are affected by risks connected with dust inhalation.

The finding is in line with Yeboah's (2008) examination of the effect of mining exercises on the strength of individuals in Sanso, Anyinam, Anyinamadokrom, Abombe and Tutuka. He found that inhabitants experience intestinal sicknesses, skin infections, looseness of the bowels, fever, colds and catarrh. The study ascribed the pervasiveness of skin infections to defilement of water bodies which a few inhabitants rely upon for water, food, and other household purposes. As per Akabzaa and Darimani (2001), skin rashes are prevalent especially among communities living along waterways and streams, in light of the fact that such communities routinely get spilled cyanide waste waters and other mining waste inside concessions.

Community security

The next areas of illegal mining implication on the livelihood of the communities around the Atiwa Forest is air population. The participants explained this in two ways. First, it was noted that the destruction of vegetation has negative implications for fresh air. The participants mentioned that plants take in carbon dioxide and produce oxygen which humans use. With the destruction of vegetation, there are no plants to produce oxygen. Thus, the air gets polluted and affects humans. Second, the fumes from the exhaust pipes of the mining machines pollute the air. Inhaling such air can be detrimental to human health:

> *The air is as destroyed as the land. Carbon dioxide. As humans, if we don't get air, you can't be a human being. The air we inhale is the best and the one that comes out of us is the bad one. Because of the mining, the air too is destroyed. Sometimes you breath in air and it is like they are using blade to cut your nose. The air is not good. At first, trees produce good air and produce good fruits which fertilizes the land. Today, we have cleared all lands. Soon Ghana will become a desert.* (Community member 9, Adadetem, 15th June, 2022*)*

> *Yesterday there was sunshine and one would expect fresh air in it. But because of the gallamsey, trees were destroyed. Everything has become some way* (Community member 6, Adadetem, 15th June, 2022)

> *When they are walking close to the town, sometimes the smoke from the exhaust pipe of the machine is not good* (Community member 15, Adadetem, 15th June, 2022)

*Air pollution; some of the machines are weak, so they blow smoke (*Community member 3 Kibi, 15th June, 2022)

The results of the current study's investigation into air pollution are consistent with those of Akabzaa and Darimani (2001), who discovered that mining activities cause the discharge of particulate matter into the atmosphere. The airborne particulate matter and discharges of dark smoke have been the subjects of the impacted populations' complaints about the quality of the air. Respirable residue, sulfur dioxide (SO2), nitrogen dioxide (NO2), carbon monoxide (CO), and dark smoke are among the airborne pollutants that pose a serious threat in the Tarkwa region. Exhaust from the boiling of sulphide metals during refining procedures is another. People's health is at risk when airborne particulate matter is released into the environment. All fine residues have the potential to worsen asthma and joint inflammation in people who already have them, as well as to induce respiratory illnesses and issues when exposed to high levels of fine residue. Due to the high silica content of the dust created by gold mining operations, silicosis and silico-tuberculosis have been linked to the area (Akabzaa & Darimani, 2001).

Personal security

The next area of assessment is death. In this instance, the participant noted that the uncovered mining pits become death traps. Relatedly, the pits may break on the miners (when they are working underground) and kill them.

> *If you're not careful, you may fall into the pits. And if you don't get anyone to rescue you, you will die. (*Family Head One, Adadetem, 15th June, 2022*)*
>
> *Sometimes you hear that the pit collapses on them. And when someone dies, it is the police who takes charge…. Here, I have heard of the death of two people* (Community member 16, Kibi, 14th, June 2022)

The issue of people dying through illegal mining activities has been reported in several other studies. As Adjei et al. (2012) refers to, on 27th June, 2010, when a *galamsey* pit collapsed close to the Ofin River at Dunkwa-on-Offin in the Central Region, more than 100 miners lost their lives. A rescue operation was set up to recuperate the bodies; notwithstanding, they could recuperate just 13 bodies, as they were hampered by spilling over water from the Ofin River (Basu et al., 2015).

The Conflicts that arise out of the Activities of Illegal Mining

This section provides evidence on the second specific objective. This objective sought to examine the conflicts that arise out of the activities of illegal mining. Consequently, the instrument was designed to capture the nuances regarding the issues of conflict emerging from the illegal mining activities. From the data analysis of the interviews, it was clear that conflicts erupt at the mining areas. These conflicts occur among the miners, miners and regulatory bodies, and miners and the communities. With respect to the conflict among miners, the study revealed that such conflicts occur around money-sharing. That is, interpersonal conflict among the community members. One respondent noted:

When they are sharing the money, there is sometimes conflict.

*(*Community member 3 Adadetem, 15th June, 2022*)*

Two other respondents related:

Ehrrr it brought theft, bad behavior, fight? Someone could hit another person's head with a shovel. There is misunderstanding among them (the miners), someone says he is being cheated, so he won't understand.

*(*Community member 4, Adadetem, 15th June, 202*)*

*Yes, it is true. Sometimes, some people, when you work with them and the money comes, he becomes "eye red". He becomes greedy for money. So in sharing the money, it creates conflicts. You know you have worked and got 30 million. You know you are three so each person should get 10 million. One person can take the money and claim he is the leader, and he will give each of you 2 million or 5 million. When it happens like that, it creates big conflicts. (*Community member 6 Adadetem, 15th June, 2022)

As can be seen from the quotations above, the conflicts are money-related. It often erupts when people feel cheated by their greedy fellows. In some other instances, the miners could fight over land concessions.

*Yes, they fought over lands. This person will say this is my land. Another person will say this is my land. When it happens like that, they each invite the police and it erupts into conflicts. Sometimes the miners fight among themselves and some get wounded (*Community member 7, Adadetem, 15th June, 2022*)*

As noted in the quote above, miners fight over lands, and it takes the intervention of the police to resolve those conflicts. Through the conflicts, people sustain various levels of injuries. The respondents made particular reference to a land-related conflict involving a mining company called Extra Gold and the individual miners in the community. Below is the view of one of the respondents on this particular conflict:

> *For conflicts, it started when a company, Extra Gold, came here. At that time, part of the land had been given to some individuals who also employed some boys for gallamsey. When the company came, they wanted to take that land, and it led to conflicts. There were even gunshots in that conflict. They went to high court and the boys won* (Community member 14, Kibi, 14th, June 2022).

As can be seen from this quote, the fight was between Extra Gold, which laid claims over some lands, where other individuals were conducting their mining activities. The disagreement between these individuals and the company became the source of the conflict. The community members supported this opinion. He had this to say:

> *Yes, we had conflicts with the community people and it got to Koforidua High Court. They (EXTRA GOLD) fought with us. The verdict went against them. They said the land is their concession so they won't allow us. We said we are community members so we will also get machines and mine. Knifes were pulled and people were slapped. The case was sent to the police station and from there it was sent to Koforidua. There was a*

litigation for about three years, and the community finally won the case. (Community member 6 Adadetem, 15th June, 2022)

For this gallamsey operator, the conflict was between the mining company and the community. According to him, the company, upon arrival, claimed the land was its concession so it won't allow the townsfolks to mine there. These townsfolks disagreed, got their own machines and started mining, which erupted into armed conflicts. It became a court case for about three years until it was finally resolved in the favour of the community.

One woman also explained a conflict about what she termed "*kolikoli*". According to her, *kolikoli* is a term used to describe a mining practice involving women. These women go to the mining sites when the mining companies are done with their work. Once these women go to the sites to undertake the *kolikoli*, they fight over territories, and this results in conflicts:

*Sometimes when the women go to wash the sand for gold dust after they had left, it creates conflicts. They fight for territories. Sometimes, they use sticks to demarcate their boundaries, which sometimes leads to conflicts. The main miners sometimes beat us, when we get there and they're still at work. (*Community member 3 Adadetem, 15th June, 2022*)*

In other cases, miners create rules, and conflicts occur when some people fail to abide by the rules. For instance, as one miner noted, there is a rule that children should not be allowed at the mine sites. However, some people disobey the rules and bring their children there. This creates conflicts and confusion. He had this to say:

> *There was a lot of confusion. They said children should not come there. But some people come with their children. This creates conflicts and fights (*Gallamsey Operator One Adadetem, 15th June, 2022*)*

Another woman mentioned that there is a conflict between a community members and miners. According to this woman, the miners are mostly foreigners who, with the assistance of some indigenes of the area, get land to carry out the mining activities. In a case, the indigenes feel cheated, it becomes a conflict:

> *There are also conflicts between the miners and the townsfolks. The miners are mostly foreigners and it is the townsfolks that show them the land. If a town person feels cheated, it creates conflicts. (*Community member 5 Adadetem, 15th June, 2022*)*

In some instances, conflicts erupt amongst community members. As one woman explained, a family member introduced a miner to her farmland without her knowledge. Before she realised, the miner had destroyed the crops. This became a conflict but she decided to let it go, since the culprit was a relative. She explained:

> *One family member invited them and they destroyed our crops. It became a conflict, but since he is a family member, we forgot about it. (*Community member 12 Adadetem, 15th June, 2022*)*

Finally, conflicts erupt between law enforcement agencies and the miners.

> *So we are having those conflicts. And for the illegal miners themselves, immediately they see you in the forest, they will be running, you will be chasing them, they will try to escape, they will try to confront you. Those things sometimes happen.* (District Assembly One, Kibi, 15th June, 2022).

As explained above, the illegal miners do confront the law enforcement agencies, when they try to stop them from mining. Numerous studies have examined the conflicts in Peru due to mining. Oxfam America (2009) acknowledges that viciousness from adjacent communities is a result of the inadequate pay granted to local governments in light of financial progress markers and verifiable histories of social difficulties associated with mining. According to Bebbington and Williams' (2008) estimation, mining has a negative impact on around 50% of Peru's agricultural communities. They contend that the accessibility and quality of water are important factors in a number of violent conflicts.

The main causes of the rise in social conflicts in mining were examined by Tanaka et al. in 2011. The study came to the conclusion through case analysis that social and environmental issues are the most typical source of conflict. Furthermore, it was discovered that disagreements arose because of various interpretations of what "development" and "effective land use" represent. For farmers, small-scale farming is an economic activity, a social network, and a feeling of identity; however, for the government and mining firms, the same plot of land is a capital asset that is not currently producing any income.

Arellano-Yanguas (2011) found that conflict in Peru is mainly driven by economic rents. Conflicts increase with the level of local shifts. In addition, he found that when mining companies need to obtain authorisation to actually expand their scope of operations and the power of negotiation falls to the local community, the likelihood of conflict is higher. He believes that this discovery

can be traced back to local residents' dissatisfaction with effective resource allocation and bad investment decisions of local governments.

Between 1997 and 2010, the conflicts in African nations were examined by Berman et al. (2017). They discovered that the primary factor influencing disputes is whether mining projects are situated in areas where indigenous peoples reside. Additionally, they discovered that the commodity super cycle of the 2000s was rife with conflicts. For 640 mining projects spread across five Latin American nations, Haslam and Tanimoune (2016) conducted a micro-level statistical study. They discovered that conflict is substantially connected with state and foreign ownership, open-pit mining, and the altitude of the miners.

In a study conducted in Ghana, Twerefou et al. (2017) evaluated mining disputes there using survey data. They discovered that there was a 7.1% increase in conflict chance due to pollution. Moreover, they discovered that raising the quality of elementary education and expanding career options both decreased the chance of conflict by 12.8%, 35.8%, and 6.57%, respectively. In Prestea, Ghana, Hilson and Yakovleva (2007) also looked into the dynamics of the conflict. It was discovered that the dispute in Prestea was largely the result of the national mining sector reform plan's disregard for the concerns of indigenous peoples in favor of the development of large-scale projects largely under the control of foreign nation

Guns (AK 47 assault rifles) are sometimes used by illegal mining operators to protect their operations. The anti-illegal mining team faces a significant challenge from such a group of miners. Indeed, fatal conflicts involving heavily armed illegal ASM users and locals as well as between illegal

ASM users and anti-illegal taskforce have been documented in a number of Ghanaian regions (Hilson, 2017; Mantey et al., 2016). Since the 'powerful' illicit ASM operators are rarely confronted, the anti-illegal mining taskforce instead focuses all of its efforts and attention on battling the underprivileged illegal miners. Due to this, several means of subsistence in communities of illicit miners have been made unlawful (Tuokuu et al., 2020).

The Capacity of the Regulatory Institutions to Control the Activities of Illegal Mining

The section of the results and discussion delved into the capacity of the regulatory institutions to control the negative effects of illegal mining on the surrounding communities of Atiwa Forest. To this end, the interview guide probed into the key issues regarding illegal mining when it comes to regulatory bodies. Precisely, the study sought to examine the capacity of regulatory institutions to control illegal mining. The study revealed that the regulatory institutions had good human resource capacity which is seen through their control measures, their effectiveness, cooperation among the institutions, and challenges associated with the fight.

With respect to the control measures, it was found that there was the establishment of the Okyeman Community Mining Protection Unit. This organisation goes around mining sites and arrests people involved in illegal mining activities. The people are then handed over to the police for prosecution. One member of the Unit had this to say:

> *We have decided that we will stop the pollution of Birim. So we are committed to getting the water clean. Even with those who have the license to work, when we go there and realise your work is not good, we arrest you and bring you to the police station* (Okyeman Community Mining Protection Unit Person, Kibi, 15th June, 2022)

The Forestry Commission also institutes a similar regulatory measure, involving the arrest of people involved in illegal mining. One officer of the Commission noted:

> *You visit where they are doing the illegal mining. If it is not close to any water body or pollute the water, you can see to it and advise them. There are extreme ones that you can't do anything about. You have to send them to the court for the court to decide… for illegal mining, it is hard to get the bail. It is imprisonment, fifteen years.* (Forestry Commission Officer One, Ankwadum, 20th June, 2022)

Another officer concurred:

> *There are rules and regulations enforcement. We are in charge of the forest reserves…those that will go to the forest reserve and mine are illegal miners who sneak themselves into the forest and go and do illegal mining. So anytime we heard of such activities, we try to track them, arrest them, and prosecute them. We give them to the police so that they will be prosecuted.* (Forestry Commission Officer 2, Kibi, 20th June, 2022)

The district assembly is also involved in the fight against illegal mining in the area. In particular, the assembly has formed a taskforce in charge of controlling

illegal mining. People found guilty are prosecuted and the assembly holds quarterly meetings to review the activities of the taskforce. One member of the assembly explained:

> *When they ban the illegal mining activities, people still go there. By the end of the day, the municipal assembly formed an illegal mining taskforce to look into those activities. That everybody found doing the illegal mining will be arrested and prosecuted. So every quarter, they hold meetings and give reports on those things. The municipal chief executive is the chairman of the taskforce but it involves the BNI, police, forestry commission, immigration and all other service people. Those security service people form the taskforce with some of the stakeholders, the chiefs. When they hear that someone is doing illegal mining, they go there to arrest the person, and their equipment will be seized (*District Assembly One, Kibi, 15th June, 2022)

In addition, there were attempts to educate members of the community on the negative sides of illegal mining. One member of the Forestry Commission explained:

> *We do not have direct association in order for us to educate them or something. No. We only do such education in the communities around the forest. Sometimes, we organize and educate them on how to protect the forest, the benefits of the forest to those within the community and elsewhere*
>
> (Forestry Commission Officer One, Ankwadum, 20th June, 2022).

On the effectiveness of the strategies, the study found that the approaches are effective and have led to the arrest of several illegal miners. These arrests deter others from involving in illegal mining. This has led to a significant reduction in the number of illegal miners in the area. One member of the Divisional Police noted:

> *When they are sent to the court, it deters some of them (*Divisional Police Officer, Kibi, 15th June, 2022)

A member of the Community Mining Taskforce supported this claim by saying that:

> *When we started, there were more than 2,000 people in this town. Now, it has reduced to about 100. If you check the work they are doing, we have reduced them significantly. That is how we work. We even go to the forest. We have remanded a lot of them*. (Community Mining Taskforce Member, Kibi, 15th June, 2022)

However, the regulatory authorities indicated that the measures cannot be said to be 100% effective. This is because the illegal miners have devised ways and means to outsmart the regulatory authorities. One manager of the Forestry Commission had this to say:

> *Yes, we've jailed people so for me, the mechanism is effective but I wouldn't say it is 100 percent effective, because you only arrest the people you see. What about those you do not see and the people who time you, knowing that this time the person has gone to sleep and that time the person is awake. The person will time you, when you go to sleep, the*

> *person will go there and do whatever he or she wants to do. And after he is done, he runs away scot-free. Yes, it is effective. But it's not 100% effective, because as you know, the forest reserve has not got a fence around it.* (Forestry Commission Officer One, Ankwadum, 20th June, 2022)

From the quote above, it is clear that illegal miners sometimes mine in the nights to avoid being caught. Since the regulatory institutions work in the day time, it becomes difficult to effectively control their illegal mining activities. This strategy for managing the effects of illicit mining is similar to the military-style, or a more forceful manner, that has typically been used to improve nature preservation (Adams, 2017). The improvement of military-style methods, innovations, and understanding, as well as their regular application to asset protection and assurance, are referred to in this strategy. Such a methodology has been referred to as "mobilised protection" by some (Duffy et al., 2019). Also, the fortress preservation, is a style of preservation that improves the security of biodiversity in areas with no signs of human intervention, can be traced as the origin of mobilised preservation (Brockington, 2002; Neumann, 2004; Peluso, 1993).

The support for mobilised protection originates from the way that species and other normal assets are at somewhat high dangers and there is an earnest need to forestall eradication and debasement. Duffy et al. (2016) saw that the military-style way to deal with nature preservation seems, by all accounts, to be acquiring support, becoming regulated and standardised in many spots among protection of

non-governmental organisations (NGOs) and donor agencies. In sub-Saharan Africa, a few states have embraced mobilised preservation, which has implied a more prominent level of militarisation of normal asset security procedures (Reeve & Ellis, 1995;shaw).

The military-style approach has been described in the literature on illegal mining using phrases like "crackdown," "flush-out," "periodic sweeps," "military-led sweeps," and "clamp-down" (Hilson et al., 2007, 2014; Hilso & Yakovelve, 2007; Banchirigah, 2008; Tschakert & Singha, 2007). These comments also demonstrate how governments and certain civil society organisations have embraced the military-style strategy as one of the most effective methods for halting illegal miners' deterioration of the soil, water, and forests. This strategy has been shown to prevent the unauthorised use of assets (Büscher & Fletcher, 2018; Duffy et al., 2019; Runhovde, 2017). Such a system is presented by Marijnen and Verweijen (2016) as a noble and innovative method for protecting endangered animals.

However, some have condemned the utilisation of a military-style approach as violent approach that neglects to address injustice (Annecke & Masubele, 2016; Cooney et al., 2017; Haas & Ferreira, 2018). Also, associated with the military-style approach is the displacement of individuals who in this manner experience marginalisation (Annecke & Masubele, 2016; Bush, 2009). In circumstances where communities oppose military-style control of resources, violence erupts with human rights abuses (Bocarejo & Ojeda, 2016; Neumann, 2004; Peluso & Vandergeest, 2011).

The study went on to examine the cooperation that exists among the regulatory bodies. From the interviews, it is clear that there is good cooperation among these bodies. A member of the Community Mining Task Force had this to say:

> *For the work we are doing, we work together with all those people: the police, immigration, forestry, and even fire service. We even work with AROUSA (Environmental). At some point, we give them information on the forest and we give them the GPS for them to trace the illegal miners*
>
> (Community Mining Taskforce Member, Kibi, 15th June, 2022)

One Forest Protector of the Forestry Commission also commented on the cooperation they get from the police and the district assembly. He explained that the police have been handling their cases and the district assembly also encourages them to work hard. He said that:

> *I will talk about the police, because they are handling our cases. They have been very cooperative. And the municipal assembly too. Because during their meetings, they also talk about it, they also always give us encouragement to fight the illegal activities. We don't have any impediments between us. They have not been stepping in to plead for them, especially, you know the assembly, the political aspect of it, they are not interfering in our activities. And the police too are cooperating. On this case, I will say the regional police command especially the CID have been very cooperative and the regional state attorney have been handling these*

> *cases on behalf of the state. They are doing very well* (Forestry Commission Officer 2, Kibi, 20th June, 2022)

A Manager at the Forestry Commission concurred:

> *For us, we are practicing what is called the collaborative approach to forest management. We are in direct link with the EPA, the police and the municipal assemblies. Whenever we need their assistance, we fall on them. We have meetings, we discuss ways forward, we discuss what needs to be done. In that, my people will not go and arrest people, take them to the police and the police will tell them "this case is a no-go area, so we don't want to prosecute". No, we make them aware of what the law says and the action that is supposed to be taken against them, so the case has to go to court and the magistrate there, the Judge, whoever is sitting on the case, per his review of our laws, will met out the corresponding punishment. For the district assembly, we are in direct link with them. We attend meetings every now and then to discuss the progressive aspects of the district* (Forestry Commission Officer One, Ankwadum, 20th June, 2022).

As can be seen from the quote above, the Forestry Commission operates a system that embraces contributions from other institutions, such as the Environmental Protection Agency, the district assembly, the police and the law court. Because of this collaborative approach, they get assistance from these other institutions when the need arises.

A member of the District Assembly also commented on the cooperation they get from the Community Mining Taskforce. He indicated that:

> *For the cooperation, in fact, they are up and doing well since this place is also the house of the president, they work on them very well. Their cooperation is good. They respond to any activity. They are very good. That one I can tell you. They are doing well, and they always bring reports quarterly on whatever happened. They are doing well. Their cooperation is good and it is very satisfactory* (Community Mining Taskforce Member, Kibi, 15th June, 2022)

As can be seen from the findings, the regulatory agencies use collaborative natural resource management. In recent times, the concept of collaborative natural resource management has earned respect and backing all over the world (Conley & Moote 2001). Scholars and experts have noticed that where ecological issues influence different parties with different interests, coordinated effort works with improved results. Partnerships formed for a common stewardship objective have brought about more noteworthy productivity (Butler et al. 2021). They create and benefit from expanded trust between the partners, and the management choices that arise are acknowledged with authenticity (Schusler et al., 2003).

Albeit the benefits of collaborative efforts have been broadly acknowledged, partnership requires a huge interested in time and relationship building (Smith et al., 2008). Correspondence, planning and appropriate job assignment are vital (Marriott et al., 2012). It is anything but a straightforward matter for an organisation to stress or execute cooperative approach to natural resource management.

The 1948 Forest Policy governed Ghana's forest management for a sizable period of time. This strategy concentrated primarily on managing forest reserves during a time when there were plenty of forest resources, while off-reserve woods were targeted for the extraction of lumber (Kotey et al., 1998). Due to the lack of an efficient management strategy, off-reserve woods quickly degraded.

At the same time, widespread infringement on forest reserves was caused by the expanding rural population and dwindling woods. With the intention of furthering the prudent management of all forest resources, the Forest and Wildlife Policy was adopted in 1994 (Kotey et al., 1998). This innovative approach created the institutional environment necessary for Ghana to implement cooperative forest management (Asare, 2013).

The Ghana Forestry Commission (GFC), according to Owubah et al. (2000) defines collaborative forest management as "any interaction between the Division and the local people which improves the flow of benefits to local people and enhances forest management" (p. 1). The creation of community-based forest management organisations is one of the unique projects that have been carried out under the collaborative forest management initiative. The establishment of agroforestry projects for the repair of damaged forests is another.

The introduction of the taungya system by the Ghanaian government as a component of a program to create plantations in the 1930s is thought to be the origin of modern agroforestry in Ghana (Agyeman et al., 2003; Acheampong et al., 2016). As a method of managing land for growing food crops, the taungya

system originated in Burma in the late nineteenth century (Akamani & Holzmueller, 2017).

The Taungya Framework was implemented in Ghana with the intention of increasing commercial lumber output and addressing the need for farmland for the development of food crops (Agyeman et al., 2003). By planting and caring for trees, farmers were given access to land in degraded forests where they could grow their food while supporting efforts to rehabilitate the forest. However, the initiative was discontinued in the 1980s due to a number of reasons, including the lack of justice in benefit sharing and the farmers' inability to own their own trees (Agyeman et al., 2003; Blay et al., 2008; Kalame et al., 2011; Mayers & Kotey, 1996). With assistance from the World Bank and the Food and Agriculture Organisation, the Government of Ghana presented the Modified Taungya System (MTS) in 2002 (Agyeman et al., 2003; Acheampong et al., 2016). The MTS program enhanced cooperation and the equitable distribution of benefits and obligations among the many stakeholders in accordance with the 1994 Forest and Wildlife Policy (Foli et al., 2017; Ros-Tonen et al., 2013).

The study also investigated the challenges the law enforcement institutions face in their attempt to fight against the illegal mining activities. Several challenges were identified. The first challenge had to do with wrong accusations. According to them the miners sometimes accuse them of some wrongdoings. In a case, they were accused of killing someone. A member of the Community Mining Taskforce explained:

> *For challenges, there are a lot. Sometimes when we go for operations, the miners accuse us wrongly of killing. But upon police investigations, we are vindicated. The police find out that the person is living and not dead, and it was the miners who hid the person just to tarnish our image (*Community Mining Taskforce Member, Kibi, 15th June, 2022)

He added that miners sometimes meet them with guns and other weapons, and destroy the tires of their vehicles:

> *Sometimes, when we go for operations, the miners meet us with guns and other weapons, burst our tires. Sometimes, even if you delay in sending the person to the police station, they come with crowds to free the person (*Community Mining Taskforce Member, Kibi, 15th June, 2022)

The respondents also mentioned the issue of interference. Member of the Forestry Commission specifically mentioned that sometimes, socio-political leaders come to plead on behalf of the culprits, trying to influence their release. He said:

> *You know the society we find ourselves, when you're doing the right thing, as long as you are putting people behind bars, society will frown on you. People will think you are a bad person, but in as much as we all have a role to play, we all need to execute our functions judiciously and effectively. How then can your function be effective, if there are no political, social, cultural and then whatever interference? You know in Ghana, every problem that happens has a human face. You will definitely get people who will come and say "please they beg, please consider their*

age". All these challenges are there. (Forestry Commission Officer 2, Kibi, 20th June, 2022)

Alongside these challenges are a host of logistic challenges. They mentioned that they do not have enough logistics such as cars to carry out their duties:

And also, you can talk about the logistical challenges. We don't have all the requisite logistics to carry out our duties, but we are doing our best in the wake of these challenges. It's not easy. The distances you have to walk in the forest reserve before you arrest one person is not easy. What we have is not the ideal situation, but we have some that we are using to manage. (Forestry Commission Officer 2, Kibi, 20th June, 2022)

He mentioned that due to the inadequate vehicles, they sometimes have to walk to the mining sites:

Some of the challenges is that they do not have enough vehicles. Sometimes, with the roads to the illegal mining sites, they find it difficult to get there, so they have to stop and walk for some kilometres or meters before they start operations and checking on what is going on there (Forestry Commission Officer 2, Kibi, 20th June, 2022)

The problem is compounded by the weather. Specifically, when it rains, the roads become muddy, creating accessibility problems. A member of the district assembly mentioned:

Sometimes too when they go, it depends on the weather. Sometimes it rains heavy and makes their work very difficult. Accessibility to the site is very difficult. They have to park the car and walk to the mining sites. When it

> *rains, they can't go there so people go through the rain and go and mine there (*District Assembly One, Kibi, 15th June, 2022)

Another problem concerns funding. They have difficulty getting money to fuel the vehicles. A member of the district assembly had this to say:

> *Sometimes too, the Chairman, we buy them even fuel. Sometimes the internally generated fund does not come from the people of the town, for them to get enough fund to embark on that particular activity. Sometimes, you have to fuel all the vehicles of the security services from the total filling station and later on we pay the money. So, we do not have physical money that we go physically and buy. We go and later on we pay (*District Assembly One, Kibi, 15th June, 2022)

As can be seen from the quote above, funding comes with a huge challenge, as there is no internally generated fund for that purpose. This means that they sometimes have to buy fuel on credit and pay later.

As noted, the anti-illegal mining taskforce has had an effect. In any case, a few issues like the impact of influential individuals and logistics, present critical difficulties to the taskforce. Studies have shown that the impact of influential individuals represents the best test to the activities of the taskforce. It has been reported that a few legislators and traditional rulers are engaged with illegal mining (Armah et al., 2013; Hilson et al., 2014). Thus, the taskforce members cannot confiscate the equipment of those influential people.

When the taskforce 'erroneously' confiscate mining tools of these influential people, they are compelled to release them. Similarly, when an illegal

miner who is associated with such powerful persons is arrested, the taskforce is forced to release him or her. The influence of those influential people forces the taskforce to take part in what can be thought of "catch and release". In 2020, for instance, it was reported that 500 excavators seized by taskforce have vanished from the premises of the various Metropolitan, Municipal and District Assemblies (MMDAs) ("Saga of the Missing Excavators and how much Ghana has Lost", 2020).

The "catch and release" system is unfair because it reinforces societal divides between the wealthy, disaffected illegal miners and the more powerful illegal miners who are connected to certain government officials and traditional leaders. While the weaker illegal miners, who typically rely on basic mining gear, are captured and delivered, the powerful illegal miners, who use sophisticated mining equipment, are. This method, which mostly ignores the problem of illegal mining, is a clear indication of how challenging and complicated the issue of unlawful mining has become over time (Hilson et al., 2014).

The anti-illegal taskforce faces difficulties due to the location of illicit mining operations. Notable is the accessibility issue, which was also covered in a few earlier research. According to Fisher (2007), the operational area, which includes the Ashanti, Central, Western, and Eastern regions, has a total size of about 77,459 sq. km. Illegal operations are dispersed throughout the operational region, some of them are situated in extremely isolated locations. Since many illegal mining sites are in remote areas and require local intelligence to locate

them, the anti-illegal mining taskforce is unable to patrol every unlawful mining site.

Due to this, the majority of the anti-illegal mining taskforce's efforts are centered in well-known illicit mining locations, particularly those that are part of the concessions of significant mining firms. The anti-illegal mining taskforce deals with resentful people in these areas who are experiencing poverty and economic hardship as a result of land displacement brought on by large-scale mining industries (Fisher, 2007). The struggle against illegal mining is dirty and difficult because these impoverished, angry people are eager to dig on areas that properly belong to them, not merely for subsistence but also for justice (Andrews, 2015).

The logistics issues identified in the present study echo the findings of previous studies. As noted by Asamoah and Osei-Kojo (2016), policy implementation on the issue of illegal mining is usually faced with logistics problems.

Table 2: Regulatory Bodies and Capacity

Regulatory bodies	Capacity
1. Forestry Commission Officer	Protect the forest resources
2. Community Mining Taskforce	Ensure responsible mining
3. Mineral commission	Regulate mining of mineral resources
4. Divisional police	Enforce laws divisional level
5. District police	Enforce rules and regulations at the district

6. District Assembly	Ensure miners have the legal authority to mine

Field data, 2022

Coping Strategies People Use in the Face of the Onslaught of Illegal Mining

This section presents the fourth specific objective of the studies. The objective sought to examine the coping strategies residents of the selected community adopted to offset the impact of the illegal mining activities. The study found that people used pure water, weed around pits and used mosquito coils, cover pits and plant trees, and relied on medications.

As noted early on, the illegal mining activities have affected the water bodies. This means that water from the rivers and the pipe has been rendered impure. This means that the people would have to rely on other sources of water for survival. In view of this, the people explained that they rely on pure water. One woman explained that one has to send pure water to the farm since Birim and other water sources have been rendered undrinkable:

> *So as for water, we don't get some to drink. So if you don't send pure water to your farm, you won't get water to drink. (*Community member 4 Adadetem, 15th June, 2022*)*
>
> *You buy and send water to farm. (Farmer* Three Kibi, 15th June, 2022*)*
>
> *Some buy pure water, and others rely on bore holes (*Community member *3* Adadetem, 15th June, 2022*)*

Apart from drinking, people also relied on pure water even for bathing purposes. This is because bathing with water from the polluted water sources could result in

skin infections. The woman, however, indicated that since they got some money from the illegal mining activities, they were able to buy the pure water to bath:

> *We had to use pure water to bath. But because there was money in the system, we could buy it. (*Community member 7 Kibi, 15th June, 2022*)*

This finding is comparable to the findings of a study in Zimbabwe. In that study, it was reported that due to the pollution of the water bodies, people relied on the polluted water sources mainly for washing and used other water sources for other household activities such as drinking and cooking. In particular, some walked for long distances to get clean water while others harvested rain water during raining season (Makwerere, Chinzete, & Massimo, 2018). In Ghana, a study by Appiah, Ohene and Afram (2013) at Konongo and Odumasi revealed that people coped by adopting several strategies, including boiling the water before use and using chemicals to treat the water before use.

Another coping strategy is land reclamation. This involved refilling of the pits to save people from falling into them. Sadly, even with the filled pits, it will take time for the land to regain its nutrients to make it suitable for farming. Two of the respondents had this to say:

> *The pits are being filled. (Farmer* 3 Kibi, 15th June, 2022*)*
>
> *The community is trying to cover the pits. But with the covered lands, they cannot be used for farming. It will take time for the land to gain its nutrients (*Community member 21 Kibi, 15th June, 2022*)*
>
> *The government made us plant trees so the air is getting better…. The pit can also be covered.* (Community member 4, Kibi, 15th June, 2022)

To support these views, one respondent noted that the Okyehene has made a rule that everyone should fill the pits after the work. When they failed to fill it, the community will fill it and claim the land. In such cases, since the lands cannot be used for agricultural purposes, they are sold as plots of land for human settlement. He explained:

> *Okyehene announced that if you give land for people for gallamsey, you need to cover the pits when they are done. If you don't, and the community rather covers it, the land ceases to be yours. It becomes the property of the community. Nobody was able to cover his or hers. Because of that the community has started covering them. If someone wants a plot, then we sell it to them.* (Royal One, Kibi, 15th June, 2022)

In a study by Ontoyin and Agyeman (2014) among mining communities in the Talensi-Nabdam District of northern Ghana, similar land reclamation strategies were reported. They noted that while some miners reclaimed the land, some did not. As a result, the community members got themselves involved in the land reclamation process, which they considered expensive, especially when it involved buying chemicals and fertilizers to nourish the land. Land reclamation involving afforestation has also been reported in Colombia (Thomas, 2014).

To deal with the issue of mosquito breading in the stagnant water in the pits, the people resort to clearing of bushes around the pits. In addition, others use mosquito coils and repellents to control mosquito bites at night. One community member operator explained:

> *We try to weed around the pits, and in the evening, people buy mosquito coils and repellents to control the mosquitoes (*Community member 5, Kibi, 15th June, 2022*)*

For those who suffered medical conditions, they relied on a variety of coping strategies. These include, the use of medicines, plaster and a visit to the hospital when the condition becomes worse.

> *Sometimes some men and women come to sell drugs at the information centre. Sometimes we buy the ointment and apply it to the affected area. If you have to drink the medicine, you buy it and drink. When it becomes serious, I visit the hospital.* (Community member 8 Kibi, 15th June, 2022)
>
> *Sometimes you are cut by the implement. But it is a minor injury so I buy plaster (*Community member 17 Kibi, 15th June, 2022)

As can be seen from the quotes above, locally-made balms and plasters were used for minor health issues. It is only when the issue becomes serious that the miners visit the hospital. This finding is in consonance with the findings of some previous studies on the coping strategies adopted by miners to solve their health problems. For instance, a study by Wireko-Gyebi et al. (2022) among six mining communities revealed similar coping strategies. In particular, Wireko-Gyebi and colleagues found that miner's resort to the use of a variety of medications, including painkillers, tramadol, marijuana and blood tonics. In another study, it was revealed that miners use herbal medicines, such as balms, for their medical conditions, especially hand injuries (Grätz, 2003).

Table 3: Coping Strategies for the Menace of Illegal Mining

Coping strategies	Actors
1. Land reclamation	Community members
2. Covering mining s	Community members
2. Use of insecticides	Community members
3. Apply ointments	Community members

Field data, 2022

Policy Interventions Needed to Address the Problem of Illegal Mining in the Atiwa Forest Reserve

This section of captures the last specific of the study. Here, the study sought to investigate the policy interventions needed to address the problem of illegal mining in the forest reserve. Three key findings emerged: creating employment opportunities, enforcement of laws, sensitisation.

From the interviews, it became evident that people engaged in illegal mining activities at the study area due to lack of jobs. Because of this, the respondents noted, once jobs are created for the youth, they will get employed and stop the illegal mining. A member of the district assembly mentioned:

> *The government should create more factories. Or the youth should be trained. They should create an enabling environment …so that by the next two or three years, they have their job. After that, they should supply them with some of the machinery and set up a place for them. I think this can reduce some of the illegal mining activities (*District Assembly One, Kibi, 15th June, 2022)

The quote above highlights the need for job creation, specifically, the building of factories. For the respondents, once factories are built to absorb the youth, the problem of illegal mining in the areas will be solved. Alternatively, the quote highlights the need for the government to train the youth to enable them acquire skills for them to be self-employed.

On the issue of job creation, one farmer also had this to say:

*When there are jobs, the gallamsey will go down. They should build factories. There is no factory in our community. From Suhum, Kyebi Asiakwa going, the fact is we don't have any factory in the Eastern Region. So it makes the youth of Okyeman suffer a lot. We are hungry. Because of that, all our wives have divorced us. They should help us. If you are using it for academic work, tell our leaders to help us (*Community member 6, *Kibi, 15th June, 2022)*

This man also highlighted the need for the government to build factories. He noted that illegal mining has resulted from the unavailability of factories in the Eastern Region, which has rendered the people, especially the youth, jobless. Thus, the illegal mining becomes the only way to survive. This finding echoes the finding of Banchirigah (2008) that illegal miners would engage in alternative jobs, if they were available, rather than the illegal mining. Hilson (2017) has also found that it is hardship and youth unemployment that pushes people into illegal mining in Ghana. This suggests that until the problem of unemployment is tackled in the study area, the menace of illegal mining will continue, since it offers jobs for the youth.

Another issue mentioned is that government needs to sensitise or educate people on the negative sides of illegal mining. Once people get to know the evil sides of the mining activities, it is likely that they will stop the illegal mining:

> *The recommendation I will give is that government should provide more logistics, and then sensitization should be given to the people. The chiefs and the people should intensify on the illegal mining, and the effects it imposes on our natural resources like our water, trees, and other things.* (District Assembly One, Kibi, 15th June, 2022)

> *First of all, people need to be educated. Even though we are doing this education on a larger scale from community to community, people are still of the view that they are suffering so they need to survive and they think the means for survival now is to do illegal mining. But they tend to forget that sustainability is attaining benefits from resources now and not preventing future generations from also attaining benefits in future. So now because we think we are in hard times so we are trying to survive and all that, if you are able to survive and you give birth and your children are not able to survive, what have you done? You have indirectly affected their future. You get it? So we all need to educate the people and let them understand the negative repercussions of what they are doing.* (Community Mining Taskforce Member, Kibi, 15th June, 2022)

Finally, it became evident that law enforcement can help stop the problem of illegal mining.

*Policies, the laws are there and it is left with enforcement. Formulation of new one and making sure that all these laws and policies we have formulated are working (*District Assembly One, Kibi, 15th June, 2022)

This finding agrees with the finding of Teschner (2012) that illegal mining has continued in Ghana due to the relaxation in law enforcement. In order to see to the end of the problem, it is imperative for the government to regularise mining activities through law enforcement and also make attempts to curtail the environmental problems associated with it. Wireko-Gyebi et al.'s (2020) study also revealed that lack of law enforcement explains the rise in illegal mining in Ghana. Additionally, a study by Agyeman (2017) established that some members of Ghana's law enforcement institutions, particularly the military and police, were encouraging illicit activity by defending specific Russian and Ukrainian ASM sites in the Ashanti region. This further supports the conclusions of earlier research on the phenomena (Hilson & Maconachie, 2020).

Chapter Summary

This chapter presented the findings of the study, which were discussed in the light of the existing literature. The implications of illegal mining on the livelihoods of communities around Atiwa forest has been discussed. In addition, the conflicts that emerge from illegal mining activities have been examined. In addition, the capacity of the regulatory bodies has been examined. Also, coping strategies that people adopt to offset the negative implications of illegal mining were considered. Finally, policy interventions that can help address the issue were

discussed. The next chapter concludes the study by highlighting the key findings, recommendations and areas for further research.

CHAPTER FIVE

FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

This chapter is the final chapter of the thesis. The chapter specifically tackles three main issues. First, it provides a summary of the entire research. Second, it highlights the key findings of the study. Third, it makes policy recommendations based on the findings of the study. Finally, the chapter highlights areas for further enquiry.

Summary of the Study

Illegal mining has been on the rise in Ghana and in recent times, illegal miners have attempted mining activities in the Atiwa Forest. The present study, therefore, sought to investigate the human security implications of the illegal mining activities on the residents of communities around the Atiwa Forest. Specifically, the study sought to attain the following objectives:

1. Assess the implications of illegal mining activities on the livelihoods of people around the Atiwa Forest.
2. Examine the conflicts that arise out of the activities of illegal mining.
3. Assess the capacity of the regulatory institutions to control the negative effects of illegal mining on the surrounding communities.
4. Examine the coping strategies people use in the face of the onslaught of illegal mining.
5. Recommend policy interventions needed to address the problem of illegal mining in the Atiwa Forest Reserve.

In order to attain the objectives, the study relied on the theory of human security as well as Maslow's hierarchy of needs and resource curse theory. Grounded in the qualitative research design, the study sampled 31 participants, including affected farmers, members of the Police and Mineral Commission, members of the district assembly and traditional leaders in Kibi, Adadetem and Ankwadum communities of the East Akim Municipal area. These respondents were interviewed with an audio recorder. For those who could speak English, the interview was conducted in English, while those who could not speak English were interviewed in Twi. The English audio recordings were transcribed verbatim while those in Twi were translated into English and then transcribed. The data were manually analysed thematically.

Key Findings

In terms of the implications of the illegal mining activities on the livelihoods of the people, some key issues emerged. First, the study revealed that the illegal mining activities have affected the main sources of water in the communities. In particular, the rivers and pipe borne water are all affected, rendering them unsuitable for drinking and other household uses. Second, the illegal mining activities were found to have affected the food security of the people. The destruction of farmlands has rendered them uncultivable. This has led to a reduction in food crop production in the area, with the ultimate implication being hunger. In addition, personal security has also been compromised, as miners sometimes die in the mining process when pits collapse on them. Moreover, the illegal mining has also affected people's health security. People reported suffering

from some ailments, including body pains and malaria, due to the illegal mining activities.

In regard to the conflicts that emerge from the illegal mining activities, the study revealed that conflicts occur among the miners, miners and regulatory bodies, and miners and the communities. With respect to the conflict among miners, the study revealed that such conflicts occur around money-sharing when people feel cheated by their greedy fellows. In some cases, conflicts arise from land concessions and disregard for rules.

The study also sought to examine the capacity of the institutions mandated to fight illegal mining. It was found that these institutions normally arrest and prosecute people caught undertaking illegal mining in the area. In addition, education was offered to the people in the surrounding communities. It was reported that the regulatory institutions engaged in collaborative forest management. It was found that though these strategies have led to the arrest of a number of illegal miners, they cannot be said to be absolutely effective. This is because some illegal miners sneak into the forest at night and carry out their activities. Because the regulatory bodies do not work at night, they could not arrest such illegal miners. Moreover, a host of other problems militated against the effectiveness of the fight against illegal mining. For instance, it was found that some of these illegal miners are connected to some powerful individuals who come to beg on their behalf. Also, the mining sites become inaccessible, especially during raining seasons. Also, the regulatory institutions reported on logistics problems, which have also affected their effectiveness.

The study also revealed that the people use a number of coping strategies to offset the impact of illegal mining activities on their lives. In the first place, because people cannot use the river water for household activities, they rely on other sources of water for survival, particularly, pure water. Another coping strategy is land reclamation. This involved refilling of the pits to save people from falling into them. Sadly, even with the filled pits, it will take time for the land to regain its nutrients to make it suitable for farming. To deal with the issue of mosquito breeding in the stagnant water in the pits, the people resort to clearing of bushes around the pits. In addition, others use mosquito coils and repellents to control mosquito bites at night.

For those who suffered medical conditions, they relied on medicines, plasters and a visit to the hospital when the condition becomes worse.

The study also inquired on policy interventions needed to address the problem of illegal mining in the forest reserve. It was found that job creation in the study area can solve the problem of illegal mining. This is because people engaged in illegal mining activities at the study area due to lack of jobs. The study also revealed the need for the government to sensitise or educate people on the negative sides of illegal mining. Once people get to know the evil sides of the mining activities, they are likely to stop the illegal mining. Finally, it became evident that law enforcement can help stop the problem of illegal mining.

Recommendations

Based on the key findings and conclusions of the study, the following recommendations were put forward to aid human security of residents in communities surrounding the Atiwa Forest

1. The Environmental Protection Agency (EPA) should ensure that mercury and other harmful substances are not released into water bodies by illegal miners. Having done that, environment security would be ensured.
2. Government should create alternative sources of livelihood for the youth. The alternative livelihood would provide personal security for the community members.
3. All mining pits should be covered by the illegal miners or reclaimed to avoid loss of lives. This would guarantee the personal security.
4. All traditional authorities in whose jurisdiction illegal mining takes place should be held accountable by the EPA for the destruction of the environment.
5. District Assemblies within illegal mining communities should embark on afforestation drive. This initiative would enhance holistic human security covering all the dimension.
6. Government should intensify its efforts against illegal mining activities in the country. This initiative would enhance holistic human security covering all the dimension.

Areas for Further Inquiry

The study examined the human security implications of illegal mining on communities surrounding Atiwa Forest area of Ghana and analysed the capacity of state institutions at combating illegal mining in Ghana. To further contribute to knowledge on the subject matter, the following suggestions for further studies are made:

Another study should be conducted to determine the specific role that the various security agencies have played in the fight against illegal mining in Ghana. Another study should be conducted to determine the extent to which continuous illegal mining impact on water bodies in Ghana and its implications.

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APPENDIX

INTERVIEW GUIDE
Miners

RQ 1: Assess the implications of illegal mining activities on the livelihood of people around the Atiwa Forest.

1. Does it have any implication on your health? [Health]

   If yes, how?

   In what ways does it shape your livelihood?

2. Does it have any implication on food security? If yes, how? [Food]

3. Does it have any implication on the environment? If yes, how?

a. How does it affect water bodies?

b. How does it lead to air pollution?

4. Does it lead to unemployment? If yes, how? [Economic]

a. Is the business profitable? If yes, explain

5. How does it lead to physical violence? [Personal security]

6. How does it lead to conflicts between:

a. Miners and government?

b. Miners and community members?

c. Miners and other miners?

7. How does it lead to crime?

8. How does it lead to rape? [Community security]

9. How does it affect political repression?

10. How does it affect human rights abuses? [Political security]

11. How does it lead to water pollution?

12. How does it lead to air pollution?

13. How does it lead to land degradation? [Environmental security]

RQ 2 Examine the coping strategies people use in the face of the onslaught of illegal mining.

14. What do you do to overcome the challenges that come with illegal mining in relation to each of these?

a. Health issues

b. Economic problems

c. Food security

d. Personal security

e. Community security

f. Political security

g. Environmental security

RO3: Examine the conflicts that arise out of the activities of illegal mining.

15. What conflicts do you experience in your illegal mining activities?

16. What are the causes of conflicts?

17. Who are the actors involved?

18. How does the conflict affect you?

19. How does it affect your family?

20. How does the conflict affect your communities?

21. Can you suggest ways these conflicts can be resolved?

Opinion Leaders

RQ 1: Assess the implications of illegal mining activities on human security of people around the Atiwa Forest.

1. Does it have any implication on your health? [Health]

   If yes, how?

   In what ways does it shape your livelihood?

2. Does it have any implication on food security? If yes, how? [Food]

3. Does it have any implication on the environment? If yes, how?

c. How does it affect water bodies?

d. How does it lead to air pollution?

4. Does it lead to unemployment? If yes, how? [Economic]

b. Is the business profitable? If yes, explain

5. How does it lead to physical violence? [Personal security]

6. How does it lead to conflicts between:

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f. Miners and other miners?

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21. Can you suggest ways these conflicts can be resolved?

INSTITUTIONS

1. What are the control mechanisms in place and how are they enforcing the rules and regulations?
2. How effective are these mechanisms?
3. What cooperation are you getting from EDA, Police, and the District Assembly?
4. What are the challenges associated with enforcing the rules?
5. What recommendations will you make to resolve those challenges?
6. What policies can help solve the problem of illegal mining in these communities?