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THE EFFECTS OF SAND WINNING ON AGRICULTURAL SUSTAINABILITY IN TWO COMMUNITIES IN KPONE- KATAMANSO MUNICIPAL OF GHANA.

BY

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DECLARATION

I, hereby declare that with the exception of appropriately acknowledged work from relevant sources, this dissertation, **"THE EFFECTS OF SAND WINNING ON AGRICULTURAL SUSTAINABILITY IN TWO COMMUNITIES IN KPONE- KATAMANSO, MUNICIPAL DISTRICT, GHANA**, emanated from my active fieldwork/research carried out in the study location under the supervision of Dr Andrew Agyei-Holmes and that the dissertation has not been presented elsewhere for the award of a any other degree.

ADEBIMPE PAULA BADA ..... **DATE: 20th February 2023**

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DR. ANDREW AGYEI-HOLMES ..... **DATE: 20th 2022**

(Supervisor)

DEDICATION

This work is dedicated to God Almighty, the giver of wisdom, knowledge and understanding and to my parents Mr. & Mrs. E. T. A. Bada for their love, support and immeasurable contribution to my academic pursuits.

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LIST OF ABBREVIATIONS

ASM	Artisanal Small- Scale Winning
EPA	Environmental Protection Agency
GSS	Ghana Statistical Service
ISSER	Institute of Statistical Social and Economic Research
KKD	Kpone Katamanso District
LSM	Large Scale Winning
UNEP	United Nations Environmental Programs
WCED	World Commission on Environment and Development

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ABSTRACT

The primary goal of this study was to investigate the effects of sand winning on agricultural sustainability in two communities of the Municipal District of Kpone-Katamanso. The study specifically looked at the extent to which sand winning activities contribute to environmental degradation; how these degraded lands resulting from sand winning affects farming activities and ultimately the wellbeing of local community members whose farming activities have been compromised. The study was conducted using a mixed methods approach where results obtained from a survey of 240 respondents Nanoman and Kpone-Bawleshie communities of the Municipal were augmented with key informant interviews on the same subject matter. Data gathered from questionnaires were analysed using SPSS whiles that of the interviews were recorded and transcribed. The results of the study suggest that sand wining leads to loss or reduction in farmlands, reduction in soil fertility and exacerbates soil erosion. This causes livelihoods to be lost and income levels of households to also reduce by half. Therefore, soil wining if not properly regulated has a negative effect on agricultural sustainability. Based on these findings, the study recommends that government institutions in charge of regulating and monitoring winning activities in Ghana should intensify their monitoring operations to ensure that illegal sand wining and poor winning activities are curbed. This will also ensure that sand winners reclaim lands after operations to avoid pit holes and stagnant waters that may breed mosquitoes and cause diseases in winning communities. Community members in these whose livelihoods are likely to be affected should consider diversification into other income generating activities.

CHAPTER ONE

INTRODUCTION

1.0 Background of the Study

Sand winning is the gathering and transportation of solid earth resources such as sand and gravel as raw materials for road and building construction (Hull, 2001). Sand winning includes sand from beaches, inland dunes and dredging from ocean beds (Peck et al., 2010; Chambers, 1997). Sand winning, according to the United Nations Environmental Programme (UNEP, 1992), has the potential to reduce agricultural land productivity. This is linked to food security since areas that were formerly utilized for cultivation are being destroyed. According to Padmalal and Maya (2014), sand winning has a substantial influence on resource availability, including restricted access to fertile agricultural fields, making it difficult for communities to produce food crops, livestock and in certain instances, fish.

Terrestrial deposits are the primary sources of sand for human activities across the world. These are composed of sand from riverbeds and leftover soil deposits on agricultural fields (Surian & Rinaldi, 2003). Sand can also be found in shoreline deposits and on the ocean floors. An important resource for building materials used worldwide is natural aggregate winning, which involves the extraction of both coarse and finely crushed rock (Gob et al., 2005). These activities may be carried out on large or small scale. However, no matter how small or large a winning activity, it is usually detrimental to environmental health (Makweba & Ndonde, 1996). Because of the negative externalities such as noise, dust, truck traffic, pollution, and visually unappealing landscapes, sand winning frequently causes land use conflicts in inhabited areas (Willis & Garrod, 1999). Because of the scarcity of high-value cropland and the uncertainty surrounding post-winning rehabilitation, this might lead to conflicts with other land users such as those in farming.

Sand is used extensively in Ghana's construction sector, with sand being used as a raw material in the construction of roads, schools, residences, offices, churches and other infrastructure projects (Peprah, 2014). The development of the built environment and real estate boom in Accra has mostly been aimed at addressing the city's and country's housing and infrastructure deficits (Mensah, 1997). This has resulted in a rise in the demand for sand from both large construction corporations and small contractors and people who are building their own structures. Sand is generally acquired from agricultural, forest and coastal sites around Ghana for such projects. Given that over time, the construction industry has emerged as a key driver of Ghana's economic development, (Peprah, 2013), their demand for natural resources including sand is generally seen as a necessary evil which needs to be managed sustainably.

Sutton and Kpentey (2012) writing on enterprises in Ghana stated that the contribution of construction to GDP had risen from 5% in 1975 to 15% in 2007. The building sector in Ghana has proven to be robust even in times of poor economic development. According to ISSER (2020), the economy's overall growth rate in 2020 was 1.7 percent that of the construction industry alone was 1.1 percent. Both fell drastically as compared to the forecasted rates mainly as a result of Covid-19. The increased demand for building materials such as sand is a result of this expansion in the construction sector. Furthermore, because sand winning is valuable, many are reliant on it for their livelihoods (Peprah, 2013). Sand winning operations contribute to a severe environmental concern that includes land degradation, biodiversity loss, and ecosystem devastation in general. Sand winning has been linked to a number of land degradation concerns, including the degradation of water quality, soil quality, and flora and fauna (Ashraf, Maah, Yusoff, Waif and Mahmood, 2011). Furthermore, sand winning has been linked to the devastation of farmlands, erosion, and roads leading to fields, creating worries about the

prospect of food security. Therefore, this study seeks to investigate the effects of sand winning on agricultural sustainability in the Municipal District of Kpone-Katamanso.

1.1 Problem Statement

Sand winning activities in Ghana have resulted in the loss of agricultural fields, putting many individuals' livelihoods in jeopardy (Abuodha and Hayombe, 2006). Farmland loss worsens economic woes even more since impacted families are frequently provided insufficient compensation (Willis and Garrod, 1999). Sand winning leads to the damage of public infrastructure as well (Collins and Dunne., 1990). Sand winning has a negative influence on livelihoods because it commonly produces land use conflicts as a result of its numerous negative externalities (Peprah, 2013). In recent years, sand and gravel winning has emerged as one of the world's most important environmental issues (Asante et al., 2014).

The Kpone - Katamanso Municipal District, like the majority of municipalities in Ghana, is grappling with development issues (Mensah, 1997). One major issue plaguing the Kpone - Katamanso Municipal District's growth and development is indiscriminate sand winning (Musah, 2009). Sand is being mined indiscriminately, resulting in soil degradation, air pollution, and environmental damage. The majority of agriculture has been lost to sand winning. The majority of man holes dug by sand winners are never recovered. When it rains, these holes collect water, providing a breeding habitat for mosquitos and other disease-causing organisms. This scenario has arisen as a result of district assemblies' incapacity to effectively regulate the actions of sand winners inside their districts (Saviour, 2012).

It has been degraded by these tendencies as well as the inability of local communities and other stakeholders to put in place proper measures to rehabilitate land after sand-winning (Turner et

al., 2007). Because local governments, district assemblies, and other interested parties failed to assess the socioeconomic consequences of sand winning, the rate of development in districts has slowed (Musah, 2009). Sand winning in Ghana is a major environmental hazard (Peprah, 2013; Mathada and Kori, 2012).

Guach (2011) reported that dust from winning sites is a major source of air pollution, although the severity will depend on factors like the local microclimate conditions, the concentration of dust particles in the ambient air, the size of the dust particles and their chemistry. Also, according to Mutisya (2006), sand harvesters have invaded seasonal rivers in arid and semi-arid areas, particularly those neighbouring cities, in search of sand. The result has been unsustainable harvesting of sand beyond replenishment levels. There is an abundance of literature on the effect of sand winning on agriculture but none of these studies to the researchers' knowledge has been carried out in the Kpone-Katamanso Municipal District. This has created a gap in literature which ought to be filled. This will help ascertain whether the results gathered from those areas are similar or contrary to that from this study. It is therefore crucial to undertake a study that focuses mainly on the impact sand winning has on agricultural sustainability in the Kpone - Katamanso Municipal District in order to fill this knowledge gap.

1.2 Objectives of the Study

The primary goal of this study is to investigate the effects of sand winning on environmental sustainability in the Municipal District of Kpone-Katamanso. The study specifically looks at:

1. To determine the perception to which sand winning activities contribute to environmental degradation.
2. To examine the effects of sand winning on farming activities.

3. To explore the effects of sand winning activities on the wellbeing of the local community.

1.3 Scope and Delimitation of the Study

Environmental impacts of sand winning on agricultural sustainability are examined in this study. So, the researcher wanted to find out how much sand winning activities are harming the ecosystem, how sand winning impacts farming operations, and how sand winning affects the well-being of local community members whose livelihoods have been adversely affected by sand winning. Additionally, the study was conducted in Nanoman and Kpone-Bawleshie communities in the Kpone-Katamanso Municipal District which are sand winning areas. However, respondents of the study were drawn for the study communities because they are the direct bearers of all the negative effects of sand wining activities undertaken in their communities.

1.4 Significance of the Study

Everyone involved in community development, including environmentalists, doctors, NGOs, and real estate developers, will benefit from the study's conclusions. Such stakeholders can use this research to better understand the environmental and agricultural impacts of sand wining. In order to generate long-term and sustainable solutions to district-level issues, the study will help to highlight the connections between the community, the Municipal Assembly, and other development organizations. Additionally, the study will contribute to the development of a stronger relationship between the community and all other groups interested in resolving the Municipality's sand winning concerns. The study's findings will also assist shape policies aimed at resolving these issues. To conclude, the study's results will help researchers and academics understand how sand winning issues in the study areas as well as other parts of the

country came to be and how they were dealt with, which will help establish the framework for future research in this area. The study's findings will serve as a foundation for students, academicians and policy makers who want to delve into the concept of sand winning in Ghana.

1.5 Limitation of the Study

Despite the fact that this study adds to the body of information, it has several drawbacks. The study will be confined to only two areas within the Kpone-Katamanso Municipal District hence can only be strictly generalizable to these two areas within the district. However, several inferences can be drawn to other areas that share context characteristics. The study sample size might also have an effect on the generalizability of the study. In addition, some of the respondents might be reluctant in giving out information for the study. This might end up affecting the flow of the study and data collection. However, all these limitations mentioned will not affect the overall results of the study.

1.6 Organization of the Study

The remainder of the study is divided into four chapters. The second chapter examines the study's pertinent literature, theories, and concepts. The study's methodology is discussed in the third chapter. The results of the data analysis are presented and discussed in Chapter 4. Chapter 5 summarizes the study's findings, draws inferences based on the primary findings, and makes policy recommendations

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter aims to examine a variety of scholarly perspectives on the subject at hand. The issues addressed in this section include, the evolution of sand winning, sand winning and sand winning in Ghana, positive and negative effects sand winning, effects of sand winning on the environment, natural resources and sustainable development, legislative framework, Conceptual framework and relevant state institution and the roles of institutions and local authorities.

2.1 Definition of Concepts

Sustainability: Sustainability is a worldview in which current and future humans are reasonably healthy, communities and nations are secure, peaceful, and prosperous, everyone has equal access to economic opportunity, and the integrity of the life-sustaining biosphere is restored and preserved to the level required to achieve these goals. All four factors of sustainability must be addressed in order to achieve this goal. It expresses the idea that future generations should be able to live on a planet that our age has enjoyed but not degraded.

Human society's economic, social, institutional, and environmental components are all intertwined in the concept of sustainable development. What it's all about: It's a way to organize civilization and human activity in a way that allows society, its members, and the economy to meet and express their full potential in the present while ensuring the long-term preservation of these ideals. On the other hand, sustainable development aims to meet the needs of the present without endangering the ability of future generations to meet their own. Protecting natural resources and preserving all of the world's species is a top priority for this organization.

Agriculture: Agriculture is the most comprehensive phrase used to describe the many ways in which crop plants and domestic animals give food and other items to the world's human population. Agraria, the Latin word for "field," and colo, the Latin word for "cultivate," both refer to the Latin agricultural field or "land tillage" when used together. Despite the fact that the term "agriculture" is typically used to describe both crop cultivation and livestock husbandry, it is sometimes restricted to the former. As a result, this definition is employed in this study.

Environment: No matter who you ask, the term "environment" is commonly used to describe an assortment of things. It is the natural landscape and all of its non-human attributes and processes collectively referred to as "nature" in this context. "environment" is a phrase that simply means "environments," therefore each individual, object, element or system's "environment" encompasses all of its surrounding entities. There are exceptions to this rule. Most of the time, the elements and systems that make up our immediate environment interact with each other in a variety of ways. Thus, comprehending the world without incorporating any notion of relationship isn't really helpful. Those who inhabit a place have an impact on the environment in which they live and are in turn influenced by it. It is true that in some cases, the webs of relationships between distinct entities might be large and complex. If you conceive of the "environment" as a space or a field in which linkages, interconnections, and interactions between entities take place, you'll get the idea.

Sand winning: Soil contains a variety of basic elements, including clay, sand, gravel, and minerals. A nonrenewable natural resource with a high tendency to degrade and a slow rate of regeneration and reformation is the case here (Mwangi, 2007). Sand is a cheap and heavy material made up of tiny particles of rocks and minerals that weather to produce beaches and deserts. River sand is taken from riverbeds and banks; unscientific winning has resulted in environmental deterioration and imbalances in the areas surrounding winning operations (Saviour, 2012).

Buildings, roads, and other infrastructure can all benefit from sand and gravel, which are collected and transported in a process known as sand winning. The phrase appears to be limited to Ghana and the African continent. Sand winning may be referred to as "sand winning" in other places. It is a sand gathering of some sort. It is frequently done illegally, and as a result, it has negative consequences for the environment. Soil winning aids in the construction of buildings and the development of land, but it can result in permanent soil loss as well as significant habitat devastation and degradation (Goddard, 2007). Soil winning is a significant environmental concern.

2.2 The Evolution of Sand Winning

2.2.1 Sand winning and Sand Winning in Ghana

Sand and stone winning operations are on the rise all over the globe, and in developing countries like Ghana which has been going on since time immemorial. Sand winning has a multitude of negative environmental consequences (Sonak et al., 2006). The fact that this practice originated in the country, however, is unknown (Biney et al., 1993; Sakey, 1991; Biney, 1982). Because most sand miners do not record their activity, this may be the reason. On the country's beaches and farmlands, sand winning enterprises are popular. Despite the inherent dangers of sand winning, it has also become a significant source of riches for many people in various sections of the country (Mensah, 1997). Sand is generally supplied from agricultural, forest, and coastal regions throughout the length and width of Ghana for building projects (Peprah, 2013; Mensah, 1997). These efforts have resulted in environmental and terrain difficulties, which have a negative impact on agricultural production, resulting in unsustainable development.

2.2.2 Institutional Framework for Sand Winning in Ghana

In Ghana, sand winning is governed by the following regulations and institutional framework. New legislation, including Act 475's Minerals and Winning Law PNDCL 153, the Small Scale Winning Law PNDCL 218 and the Sand Winning Bye-Laws, control winning and mineral exploration. For the enforcement and monitoring of these rules in each district, the Minerals Commission, Mine Department, Environmental Protection Agency, and District Assemblies are the key organizations responsible.

2.2.3 Role of the Minerals Commission

Some people consider sand to be a mineral. PNDCL 153 (Minerals and Winning Law) of 1986 is in charge here. This commission was established in 1986 by the Minerals Commission Law, which was revised in 1993 by the Minerals Commission Act, to oversee the exploration, extraction, and utilization of Ghana's natural resources. As part of its mandate, the Commission also coordinates policy in the area of mineral resources. Aside from that, it was responsible for developing recommendations for national policy on mineral resources, with particular attention to national priorities and the national economy; providing advice to the Minister on mineral-related issues; and providing advice to the Minister on mineral-related issues.

1. oversee and report to the Minister on the implementation of the government's mineral policies;
2. inspect and report to the Minister on the operations of all entities or enterprises in charge of minerals;
3. report to Parliament on public mineral agreements that are received and evaluated.
4. ensure that national mineral resources and exploration and extraction technologies are collected in a comprehensive manner for national decision making.

The Minerals and Winning Law (PNDCL 153) of 1986 must be followed by all potential sand winning contractors. Contractors must first get a license from the Minerals Commission in order to work in the districts. Due to the severe effects on the local economy and quality of life caused by land degradation, air pollution and noise pollution, this law was passed to limit indiscriminate mineral winning. Furthermore, the EPA and the District Assemblies must be satisfied before the activity can begin.

2.2.4 Role of the Environmental Protection Agency

It was in December 1994 that the Environmental Protection Agency (EPA) became a reality with the passage of legislation. In its wake, the Environmental Protection Agency was created (EPA). To ensure environmental quality, all new construction projects must undergo Environmental Impact Assessments (EIAs). The EPA also conducts monthly environmental quality inspections and assessments. As core component of their inspection and monitoring activities, the EPA works with the Minerals Commission to make sure that everything is going well. Also, general rules have been put in place to show how winning can be done in a way that is good for the environment. The Environmental Protection Agency Act of 1994, Act 490, is the basis for this study. Environmental Protection Agency responsibilities pertinent to this research include:

1. environmental conservation, and to make suggestions for the protection of the environment, to provide advice for the establishment of policies on all aspects of the environment
2. facilitate communication between environmental organizations and the ministry by serving as a point of contact and coordinating the activities of these organizations
3. to such entities as necessary to manage the volume and intensity of trash, emissions, deposits, or other sources of pollutants that represent a threat to environmental quality

4. regulate the release of hazardous substances into water and soil and other forms of environmental pollution, as well as other aspects of environmental contamination in general
5. to ensure that development projects, including new ones, follow established environmental impact assessment procedures, including those that already exist.
6. partnership and coordination with government agencies, district assemblies and other organizations for pollution reduction and environmental protection
7. to aid in the development of sound environmental management plans
8. in accordance with this Act and its rules, impose and collect environmental protection taxes
9. to establish and implement formal and non-formal education programs aimed at increasing public knowledge of the environment and ensuring the sustainability of Ghana's ecological system.
10. to encourage studies, research, surveys, and analyses that will help improve the environment and keep Ghana's ecological system alive for the long term, and
11. Permits must be obtained from the EPA in order for businesses of all sizes to participate in environmental training, collect and disseminate environmental data, and conduct the aforementioned activities.

As a result, this ensures that extractive activities have a minimal environmental and social impact. There are now just two people appointed to oversee the implementation of the aforementioned tasks in the districts.

2.2.5 Role of the Mines Department

After World War I, the Tarkwa Mines Department was formed. The Minerals and Winning Law, PNDCL 153, replaced some of the laws passed between 1966 and 1986 that gave it

authority. For the most part, the mission of Ghana's Mines Department is to ensure that the country's winning and mineral regulations are adhered to. Mines Department was founded with these specific duties in mind:

1. Acting in accordance with and enforcing occupational health and safety rules applicable to the winning industry;
2. Environmental Monitoring was carried out by a team of five police officers and a driver to establish if the winning operation was producing any nuisances in the local area.
3. Permissions for reconnaissance, exploration, and winning activities;
4. Mineral title licensing and leasing provisions must be enforced.
5. Maintaining control over mines, mills, and other mineral treatment facilities to ensure that wasteful winning or ore treatment processes are not employed;
6. investigating and deter winning the causes of winning-related incidents
7. Compiling and disseminating statistics on mine accidents: Observation and enforcement of winning regulations at the technical level (including the discovery and winning of building and industrial minerals);
8. Explosives regulations must be enforced both inside and outside the winning sector. 8.
9. Nine. Personnel responsible for training in explosives; despite the above-mentioned duties, there are only three Mines staff members.

The Function of District Assembly Laws and institutions govern the business of sand winning, just as they do for any other type of winning operation. For the sake of the environment and long-term growth, this is done in Act 462, District Assemblies are designated as environmental administrators by Section 51 of the Local Government Act. The District Assemblies are given full responsibility for environmental management, including ensuring that all potential contractors and traditional authority adhere to the sustainable environmental requirements

stated in the bye-laws for sand winning. A multi-agency monitoring team has been reduced to a one-man operation.

2.2.6 Sand Winning Bye-Laws

In accordance with the powers assigned to district assemblies by section 51 of the Local Government Act, the Ga local authority has created bye-laws on sand, stone, and gravel winning. As stated in the law:

1. A permit from the Ga District Assembly's planning committee is required for anyone who wants to mine or win sand, stone, or gravel in the GDA's authority.
2. The following must be included in the permit application:
   a. Include the name and address of the applicant.
   b. Include a map showing the location of his or her business.
   c. For example, mechanical or manual excavation can be used to win the battle.
   d. Provide an estimate of how long the winning operation will last. be countersigned by the local Assemblyman or Lady
3. The Planning Committee will then recommend to the district assembly that the permit/license be granted to the applicant once all applicable procedures have been completed.
4. The following must be included in the permit or license:
   a. The name and address of the person who is in charge.
   b. These laws say that the business must be open from 5 a.m. to 7 p.m.
   c. The permit or license's duration
   d. The charge for the permit/license, which is established by GDA on a regular basis under these bylaws.

5. Without a permit or license, no one can get sand, stone, or gravel for commercial use in the GDA's area. It could cost them $200,000 or five years in prison, or both. The permission must be shown to the GDA at all times at the site where it is being used. Rents from winning operations in the GDA's area will be as shown in the fourth schedule to these bylaws.

   a. Those who fail to pay their sand winnings will face a fine of $200,000 or five years in prison, or both.

   b. Failing to present such invoices or tickets on demand will condemn the sand winner or his agent, especially the truck driver, to a 0500,000 fine and the sand will be seized by the DA.

6. Every driver of every truck transporting sand is required to pay a loading fee, which is decided by the GDA, per trip and to be provided a receipt for his or her efforts. The receipt must be made available to the GDA task force upon request at all times. Those who fail to comply will be fined 0500,000 and their sand will be taken by the GDA.
7. It is prohibited for a licensee to sublease, assign, sell, or otherwise part with his or her license to another operator without the prior written authorization of the GDA. Those who fail to comply will have their licenses revoked and will be placed on the DA's blacklist.
8. Those who do not reclaim the site on which they were awarded the sand will forfeit their full deposit to the DA and will also be barred from future competitions.
9. In order to cover the costs of reclamation in the district, each sand winner must pay a refundable security deposit equal to 015 million before operations can begin. After the sand winner has completed operations and met all of the requirements set forth in these bye-laws, 50 percent of the prize money may be reimbursed to him or her.

10. In the event of any loss or damage to the site or any sand that results from a violation of these bye-laws or from any other source, the assembly shall have no duty to compensate the party who suffered the loss or damage. Any driver or vehicle detected within an unlawful pit winning sand commits an offence punishable by a fine of up to one million dollars on the spot, or the car is held until the fine is paid in full, whichever is greater.
11. Any truck filled with sand that is detected working outside of normal working hours will have the sand confiscated and the driver will be fined 0500,000.00.

According to Simon et al. (2000), Kumasi's population structure, density, and land use are all changing due to the city's rapid urbanization. As in other places, poverty is widespread (cf. Satterthwaite, 1995; Rakodi, 1999; Briggs and Mwamfupe, 2000). Natural resource exploitation, including loss of forest cover, widespread sand winning, and diminishing water supply and quality, are now important challenges. While this may have been inevitable, they (Simon, Mcgregor, Thompson, and Nsiah-Gyabaah, 2000) contend that the area has well-established and legitimate traditional community institutions as well as a high level of formal political organization.

Sand, limestone, clay, and salt are among the mineral resources that the GDA Three-Year Medium-Term Development Plan (2002) says the area has, however they are being overexploited without regard to environmental implications. There is little doubt that for decades, the area has provided raw materials for the building sector both within and outside of the Accra Metropolis. For estate expansion and construction, the territory is constantly winning for sand, stone, and laterite. Manhean, Ablekuma, Oblogo, Nsakina Doblo-gonno, Mallam

Gbawe, and Ayikai-Doblo are some of the sites where large swaths of previously fertile agricultural land have been lost.

In the last two decades, the Ga District has seen an uptick in sand and stone quarrying due to an increase in the need for these materials in the Greater Accra Region and other locations, according to Owusu and Albert (2002). These efforts have resulted in unproductive agriculture as a result of soil erosion and the removal of top soil. Accra's and the surrounding area's increasing population may be a contributing factor in these environmental problems. Ofankor, Pokuase, and Amasaman have risen tenfold since 1965, when they were still villages. Sand winning and quarrying activities in the Ga district have been linked to additional problems, according to Owusu and Albert (2002), including the destruction of flora and fauna, which leaves local people with no means of subsistence like fishing and farming, as well as deforestation and soil erosion, both of which lead to barren farmland and mosquito breeding grounds in ponds and stagnant waters.

It was reported in the Chronicle on Tuesday, May 27, 2003, by Benet Akwaku that the Volta area has degraded soil due to a lack of oversight over stone quarrying and sand winning. The newspaper claims that sand and stone winning and quarrying are occurring at random throughout the region, with officials doing nothing while they do so. Sand winners have been avoiding areas like as Sokode, Bame, and Akroful because the terrain there is ideal for groundnut growing. There is a lack of deterrence, according to Benet Akwaku, who alleges that the environmental management team is ineffectively overseen by institutions with a fee of only 060,000 to 0100,000. Combined with the expanding population in the national capital, the Ga District will face a graver situation.

According to Birley and Lock (1999), developing countries go through a period of transition that is linked to their economic situation but also affects their population's birth and death rates, nutritional standards, environmental conditions, as well as their general health and well-being (Kjellstrom and Roseastock, 1990, Rossi-Espagnet et al, 1991, Smith 1991b, 1997, Bobadilla et al., 1993; Anon, 1995a 1996b Popkin 1996). Local environmental dangers are cited as well by Birley and Lock (1999) as a contributing factor to conventional health risks. Rural health threats include infectious diseases including diarrhoea, worms, malaria, and respiratory infections, as well as the long-term effects of malnutrition and inefficient delivery.

According to Mensah (1997), in his paper "Causes and Effects of Coastal Sand Winning in Ghana," it is necessary to exploit coastal sand for human needs, but efficient and effective resource management is required to ensure long-term sustainability of the resource extraction process. In addition, the coastal environmental disaster necessitates a joint effort by policymakers and sand contractors, engineers, traditional rulers, and local communities. The review of legislative instruments and administrative arrangements is one of the strategies outlined in the forest and wildlife policy (1994) for institutional strengthening in order to ensure effective resource management and administration towards sustainable development, and in particular to prevent any farming, logging, sand-winning, or galamsey activities along the banks of streams, rivers, or lakes.

A winning study was included in the final report of the Ghana Land and Forestry Policy Support Facility (2005). The Wassa West District, centred on Tarkwa, has the country's highest concentration of winning activity, hence it was chosen for this case study. When it came to winning and environmental preservation, there was a lot of debate. It was found that while winning may help the economy by providing jobs and reducing poverty in the areas where they

operate, it is also a major contributor to environmental damage. Overexploitation and eventual extinction of wildlife and plants are possible outcomes of unchecked exploitation.

2.3 Sand Winning and Winning Effects

Winning for sand or winning the lottery has the following consequences:

2.3.1 Positive Effects of Sand Winning

Sand winning, despite its numerous difficulties, is regarded to have a positive impact on the economy and social well-being of many states. Sand exports from nations like Belgium, India, Turkey, Italy, and Germany brought in more than $31 billion in revenue in 2010, for instance (United Nations Commodity Trade Statistics, 2010). Sand winning is a major source of income for many people all around the world (Asha, 2011). North Stradbroke Island's sand winning activities employ the majority of the island's residents, according to a 2010 Sand Times study (Sand Times, 8th September, 2010).

For construction workers, the value of sand is immeasurable. Aggregate materials, like as sand and gravel, are produced by sand winning operations and are utilized in a variety of construction projects, including residential construction, landscaping, and transportation infrastructure. Constructing bridges and roads all require a lot of sand, to name just three examples (Velegrakis et al., 2010). In order to produce the massive amounts of sand needed to make various products, sand winning is employed. The result is that many construction projects that require sand can't be completed without sand winning. In 1986, construction companies made up 17.4 percent of Ghana's GDP, but by 2012, they had risen to 39.4 percent. (ISSER, 2010, and GSS, 2012)

Many Ghanaians are employed as a result of sand winning operations. Many people in Ghana are employed by sand winning activities, including drivers of heavy-duty trucks and labourers who dig and load the trucks with sand (Peprah, 2013). There are also high profits from sand winning activities that are put to good use in improving the quality of life for the citizens (Stewart, 2013; Musah, 2009; Mensah, 1997). In 1993, the daily minimum wage in Ghana, for example, was US$1.22. During the same time period, sand winning contractors generated a minimal net profit of $55.47 per day. According to data from sand haulers and loaders, their daily net profits were US$1.54 and US$2.16 per day (Mensah 1997).

Sand winning operations bring in a lot of money, which helps to ensure the lives of the workers. In areas where sand and stone winning happens, there is a boost in the sales of services and commodities, such as groceries, water sales, and taxi use (Asante et al., 2014). There are many community activities, including as hospitals and schools that benefit greatly from sand winnings. This ensures that many people's economic security is maintained (Mensah, 1997). Chiefs and community leaders levy tolls and levies on sand winning operations that take place within their traditional areas as a result of this. This means that sand winning can be considered as an important tool for ensuring the livelihood of a large population spread out across a wide area.

2.4 Negative Effects of Sand Winning

Many academics believe that sand winning is a destructive activity that has the potential to harm people's livelihoods in the process. The exploitation of burial land sand has a negative influence on the environment, putting people's livelihoods at danger (Sonak et al., 2006; Kelley et al., Ramsey, and Byrnes, 2004; Kondolf, 1994). Sand winning is what causes turbidity. As a result, fish and other aquatic life suffer, and their regular growth is disrupted. Due to this, the

livelihoods of fishermen who rely on fishing as their primary source of income in these regions are severely affected (Supriharyono, 2004). In India (Kerala), sand winning has wrecked the lives of many fishermen and those who rely on fishing for their livelihoods, such as fish distribution and curing. Numerous residents who depend on the land for rice farming and the survival of coastal coconut palms have lost their jobs due to sand winning in the same area (Sekhar and Jayadev, 2003).

People in Malaysia's Selangor state who are involved in farming and fishing have also been adversely affected by sand winning. Hulu, Kuala Lumpur, Langat, and other locales are only a few examples (Ashraf et al., 2011). Additionally, sand winning operations have reduced the amount of arable land in Ghana, putting the lives of many people at risk (Peprah, 2013; Musah, 2009). Families devastated by farmland loss are sometimes given little compensation, which exacerbates their economic troubles further (Abuodha and Hayombe, 2006). In addition, sand winning causes damage to public property. People's livelihoods are significantly damaged as a result of damage to roadways, underground pipes and other social facilities (Saviour, 2012; Collins and Dunne., 1990; Viswanathan, 2002). It has a tremendous impact on people's lives because sand winning creates many land use issues because of its numerous negative externalities (Turner et al., 2007; Rodriguez and Beard., 2006; Willis and Garrod, 1999).

2.4.1 Effects of Sand winning on Agriculture

Agricultural operations commonly take place on soil that contains sand. Sand winning and, for that matter, sand winning, like other winning operations, has an impact on agriculture. Sand is a natural resource with a vast variety of societal value that must be protected in order to satisfy a long-term purpose. Sand winning not only helps to the supply of resources for building, but it also provides job prospects for people who work in the business. Sand winning and

agriculture are two examples of effective sand applications that benefit society as a whole. These projects contribute considerably to the development of infrastructure and enhance food security.

Agriculture aids in the cultivation of land for crop planting in agricultural operations. Sand, for example, is mined for building reasons, but unchecked winning may harm land shape and generate deterioration. This may result in sand infertility and environmental concerns. Sand winning on farms and fallow agricultural land is increasing more frequent, according to Aromolaran (2012), and this is having apparent consequences on the soil structure, vegetation, and local wildlife in rural locations. Agriculture is typically unprofitable due to resource limits, hence small farmers lease their property for sand winning for two to three years to supplement their revenue (Gurubachan Singh et al., 2007). In certain locations, sand miners have also produced gullies on agricultural fields and forest reserves (Tariro, 2013). (Tariro, 2013).

Sand extraction under the earth's crust has harmed land cover for plants and homes for organisms that feed the soil. This state alters the environment of living beings, placing their life in peril (Lawal, 2011; Ambak and Zakaria, 2010; Phua et al., 2004). (Lawal, 2011; Ambak and Zakaria, 2010; Phua et al., 2004). Sand is an income source for both sand miners and farmers, but its repercussions are damaging to economic, environmental, and long-term development. Mineral resources must be managed in an effective and efficient manner in order to ensure long-term economic and environmental viability of the winning process (Youba et al., 2002).

2.4.2 Effects of Sand Winning on the Environment

The environmental harm caused by sand winning has been well-documented by a number of reputable researchers (Ashraf et al., 2011; Saviour, 2012; Ladlow, 2015; Akabzaa, 2000). As well as degrading ecosystems, extensive research shows that sand winning has significant negative effects on water resources (Padamal and Maya, 2014, Peckenham, 2009). This review focuses on the many environmental factors that sand winning has an effect on. As Pitchaiah points out, sand winning is a major threat to our perennial rivers and ephemeral waterways' rich biodiversity (2017).

1. Sand winning destroys riverine flora and speeds up erosion.
2. The loss of animal species and the pollution of water supplies are also a result.

According to Pitchaiah (2017), some of the implications of sand winning include:

1. It is possible that many varieties of plants and shrubs that rely on groundwater maintained by river sediments at varying depths may die when the riverbeds dry up.
2. This could have an effect on their ability to live and recruit, since the riverbed is drained of sand (Nair, 2005).
3. As a result of the dust they produce, trucks may impede plant photosynthesis (Muller, 2005).
4. Because they can easily spread to unbroken areas, burrowing invertebrates and insects as well as plants are harmed, as are larger mammals and reptiles (Muller, 2005).
5. Soil structure and river banks can be destabilized by sand winning, and isolated islands of trees can also be eroded by future flow (Pitchaiah, 2017).
6. Migratory problems may arise when water levels drop below a certain threshold.
7. When water does not cover a large portion of the streambed, aquatic creatures have a harder time growing. High-gradient streams reveal riffles and cobble substrate, whereas

low-gradient streams expose logs and snags, reducing the areas of excellent habitat (Unnona, 2007).

8. In addition to harming fish breeding habitat and macroinvertebrate habitat, heavy mechanical operating on the channel bed can also raise downstream turbidity and suspended sediment levels (Pitchaiah, 2017).
9. Floodplain accumulation and overburden could alter channel hydraulics during large storms. (NMFS, 1998).
10. More than anything, suspended sediments have a negative impact on fish because they restrict light penetration, resulting in lower food availability and plant biomass, as well as reduced visibility of pelagic and benthic food, as well as blockage and obstruction of the fish's digestive system (Bruton, M.N, 1985).
11. Destabilizing river banks and increasing sediment inputs upset the overburden's rich sea bank and organic debris in Ghana's Coastline (Pitchaiah, 2017).

Sand loss in flood plains has an impact on the water table and impacts land usage for agricultural reasons (Langer, 2003). Natural cycles of sand and gravel erosion and deposition are caused by rivers overflowing and modifying their channels from time to time. As a result, sand and gravel extraction from rivers, floodplains, streams, and channels is incompatible with river ecosystem functioning. Some of the environmental disruption is due to the winning processes and machinery utilized. Sand winning's most common environmental impact is the conversion of formerly undeveloped land (natural land) into excavations in the earth (Langer, 2003). Social forces like population increase may also be blamed for the environmental effects of aggregate winning. Sand winning has become one of the most important environmental issues in recent years all over the world.

Environmental implications of sand winning have been studied extensively in the Nzhelele Valley, Limpopo Province in South Africa (Mathada and Kori, 2012). Using rivers, stream terraces, floodplains, and channels as a supply of sand and gravel was found to be incompatible with other resources. Winning for sand has depleted natural resources like fisheries, recreation areas, and river banks.

There are environmental and sociological consequences of commercial gravel extraction and supply aggregate to the construction industry in Ghana's Northern Region, particularly in East Gonja District and Gunnarsholt in Iceland, according to Musah (2009; p. 63). In the two research locations, the sociological and ecological consequences differed, although some proved universal. It's not uncommon for development projects to have unintended consequences like destroying grazing or farming land or digging water storage ponds. These actions can lead to increased erosion and the extinction of nearby plants and animals. Abandoned winning pits, which ultimately serve as breeding grounds for illnesses like malaria, as well as the loss of vital trees, which are economically essential and, as a result, generate unemployment among women, are some of the negative effects. The contamination of subsurface water is once again documented (Musah, 2009).

Aromolaran (2012) investigated the impact of sand winning on agricultural fields in agrarian rural areas in Nigeria's Ogun state. According to the report, sand winning on agricultural land is a vital source of income for many rural Nigerians and is rapidly becoming a serious environmental concern. As towns develop, so does the need for sand for building and other purposes, according to the research. Sand winning is common on farms and fallow agricultural land, and it has a significant influence on soil structure. It also has an impact on the nearby environment and fauna. Sand winning is presently quite popular. It is the least regulated,

unregulated, and occurs at an alarming pace. The seriousness of the crisis is a source of concern for food security and environmental protection. Although sand winning aids in the construction of structures and development, it has a number of negative consequences, including irreversible sand loss and habitat destruction.

2.4.3 Effects of sand winning on Natural resource use and Sustainable development.

Resource as stated by Randall (1987) refers to something useful and valuable in the condition in which it is found. Natural resource refers to elements in nature that are naturally occurring. Essential life support is provided by natural resources in a variety of forms, including both consumer and public goods and services. Animals, fisheries, and water bodies are just a few of the natural resources at our disposal. These natural resources have been crucial to the survival and satisfaction of basic human needs.

For the WCED, sustainable development is defined as "development that satisfies the requirements of the present without compromising future generations' ability to satisfy their own needs." (United Nations, 1987). The report focused on three central pillars of development, mainly economic growth, environmental protection and social development as the essence of the development process (Kates, Paris & Leiserowitz, 2005). Nsiah-Gyabaah (2002) further indicated that sustainable development does not only involve progress based on economic growth, but on the equitable distribution of benefits, the regeneration of the environment rather than its destruction and the empowerment of people rather than marginalizing them. Thus the role of natural resources in sustainable development cannot be overemphasised. This section of the literature review will focus on analysing how these two concepts interact to ensure the general wellbeing of communities and people.

The achievement of sustainable development is a desirable development goal for any nation. It's an effort to strike a balance between economic expansion and the preservation of natural resources. Environmental sustainability is the management of Earth resources so that their quality and abundance may be maintained over time (Council of Environmental Quality, 1987). Development that meets the demands of today's generation without compromising the ability of future generations to meet their own needs is also known as "sustainable development" (The World Commission on Environment and Development, 1987). Historic evidence shows that winning has played a significant role in Ghana's economic development, and the country's colonial moniker, the Gold Coast, refers to this reality. There have been traces of alluvial gold winning in Ghana since the sixth century, according to an article by Hilson (2001) about small-scale gold winning in Ghana. Hilson (2001) further iterated that it was the high deposits of gold located in Ghana that led to it being fittingly described as the 'Gold Coast' by the Europeans in the 15th and 16th centuries.

There are two types of winning: large-scale and small-scale, the latter of which is also known as artisanal winning (ASM). "Significant Scale Winning," according to the World Bank (2009), means large investments, high returns, minimal employment, and international performance requirements in the extraction of minerals. "Low investment," "labour intensive local production," "informality, and no or low degrees of mechanization and access to market" are all characteristics of ASM, as defined by the World Bank (2009). (p. 9). Under Ghana's Minerals and Winning Act of 2006, artisanal or small-scale winning refers to concessions of 25 acres or less, which are reserved for Ghanaians alone (Act 703: 82-99).

Thus artisanal small-scale winning sector is legal however, it has become common to find small scale miners working without the appropriate licenses and permits. These illegal operations are

what have been referred to as galamsey. The legal small-scale winning companies are those registered and operating on lands they have legal access to, and subject to regulations by the Environmental Protection Agency (EPA), or the Ghana Minerals Commission, or both. The illegal small-scale miners on the other hand are those unregistered and without operating license but still operate. They operate without reference to any regulatory framework and environmental standards.

Small-scale winning can be traced back to the fourth (4^{th}) century. Before 1905 when the colonial masters made the operations of the small-scale miners' illegal, these miners were the only people who mined gold and diamonds in the traditional economy (Akabzaa M. T. 2001). It is a global phenomenon with those directly involved in the activity ranging from thirteen (13) to twenty (20) million people in over thirty (30) developing countries including Ghana, and a further eighty (80) to hundred (100) million people depending on the sector for their livelihood. (AngloGold Ashanti 2006). Within the context of this research, sand winning falls under the remit of small-scale winning as sand is also considered a mineral. Sand is considered as a mineral (Mineral Act, 2006) thus its extraction is also considered as winning.

Winning essentially refers to the extraction of minerals from the earth. It is for this reason that within some jurisdictions, it is referred to as 'sand winning'. However, according to Peprah (2013) sand winning is generally considered as illegal business as it operates on a free entry and exit basis, unregistered and unregulated. Mensah (1997), defines sand winning as the practice of extracting sand mainly through open pit. It is a type of open-cast winning that materials for the construction industry.

2.5 Theoretical framework

Treadmill Production Theory: This study is premised in treadmill of production theory proposed by Schnaiberg (1980). The theory frames economic development as inherently in conflict with environmental sustainability in the ongoing struggle against competition for increasing profits, capitalists must increase worker productivity and increase environmental extraction; profits increase, but environmental quality and worker stability decrease (Gould, Pellow, & Schnaiberg, 2004). It was the treadmill theorists like Gould, Pellow and Schnaiberg, who advocated the treadmill of production theory. While Schnaiberg was its earliest advocate, Gould and Pellow popularize the treadmill theory. The treadmill theorists gave us the context for its emergence, while explaining the logic of the treadmill and its impact on environment and society. The treadmill theorists seek structural solutions to the problems of environment (Gould et al 2004). They are critical of the dominant mode of production. It is in exploring the emergence of the treadmill theory that we will be able to understand it better.

The treadmill of production theory is a critique against the dominant (capitalist) mode of production in industrialized society. The treadmill theory laid bare some of the assumptions in the dominant mode of productions. According to this theory, new investments in the dominant mode of production are almost inevitable and necessary for higher level of resource extraction, which will yield higher dividends/profits. This will allow the creation of further new investments and new job opportunities for the workers (Gould et al 2004). However, new rounds of investment, with new technologies, would result in ecosystem depletion and pollution. It also means higher level of natural resource extraction with no corresponding increase in wages and social expenditures. In spite of these, workers continue to believe that increase investment is necessary for employment and creation of new jobs (Gould et al 2004).

2.6 Conceptual Framework

A conceptual framework is a set of broad ideas and principles taken from relevant fields of enquiry and used to structure a subsequent presentation. Mugenda and Mugenda (2013) defined a conceptual framework as a hypothesized model identifying the model under study and the relationship between the dependent and independent variables. The conceptual framework of the study was based on key concepts of the study and literature review. The conceptual framework was then used to analyze the results of the research. It was based on the impact of sand winning practices on agricultural sustainability. This is shown in the figure below;

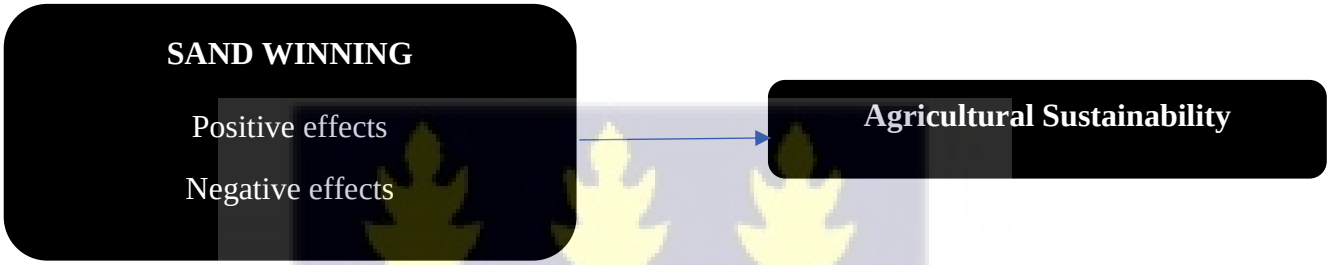


Figure 1: Conceptual Framework
Source: Field Survey, 2022

2.7 Conclusion

Clay, sand, gravel, and other minerals can all be found in soil. It is a non-renewable natural resource that can degrade rapidly and regenerate at a very slow rate (Mwangi, 2007). Sand is a cost-effective and heavy-duty source of material. In Ghana, it is an essential building material. In the construction industry, sand winning refers to the gathering and transportation of solid earth elements such as sand and gravel. This term is only used in Ghana, Africa. Other places may refer to sand winning as such. This object's constituent parts are sand.

This illegal practice has a wide range of negative effects on the natural environment, agriculture, the livelihoods of local people, and even the health and safety of local community members; therefore, it is imperative that sustainability is assured. People, communities, and nations thrive

in a sustainable world where everyone has access to health care, peace, and prosperity. In order to fulfill all of these objectives, the biosphere's integrity must be restored and maintained to the necessary degree. Without a doubt, future generations should be able to appreciate our world in exactly the same way as we do now. Systemic sustainability refers to the continuation of economic, social, institutional and environmental characteristics within a human society. Along-term strategy for ensuring that society, its citizens, and its economies can meet their needs and realize their full potential now, while also maintaining biodiversity and the health of natural ecosystems, is the goal of this approach.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

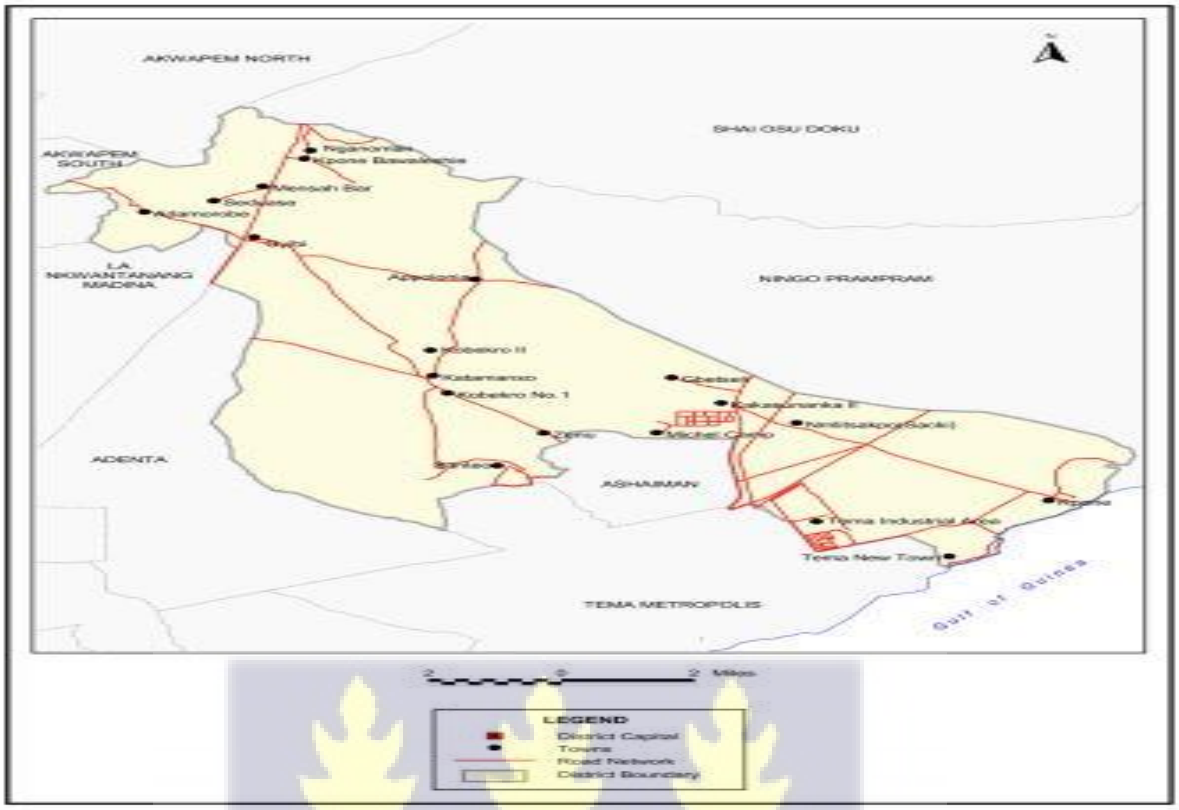
This chapter contains information on the study's methodology. Methodology, population, and sample size are among the topics covered in this section. In addition, the study examines the methodology used to obtain the data. Data sources, ethical considerations, data processing techniques, and the district's profile are all discussed.

3.1 Profile of the District

The investigation focused on the Kpone-Katamanso Municipal District's Nanoman and Kpone-Bawleshie towns, both of which are sand winning areas. In 2012, the Tema Metropolitan Assembly issued the Legislative Instrument to construct the Kpone-Katamanso District (KKD) based on the district study report (L.I.2031). Tema is to the west, Dangme West to the east, and the Gulf of Guinea to the south of the Kpone-Katamanso Municipal District. Greater Accra Region's Kpone-Katamanso District is located on Ghana's coast. The district's terrain is flat and coastal plains-like, with elevations ranging from sea level (in the south) to 35 meters (in the north).

Sand, clay and humus-rich soils are common in the area, making it ideal for farming. In some areas, the ground is extremely rough. Accra's coastal savannah zone is home to the district. Between 730mm and 790mm of yearly rainfall fall on the equatorial region, which has a dry, equatorial environment. Grassland and shrubs make up the majority of the district's vegetation. In places like Appolonia, Gbetsile, Santeo, and Katamanso, where animal rearing is practiced, the grassland can be seen on a large scale. The rocks of the Dahomeyan formation, which include metamorphic rocks such as granite, gneiss, and schist, are found beneath the region.

Figure 1: Map of Kpone Katamanso Municipal



Source: Ghana Statistical Service, GIS

Population: According to the, Ghana Statistical Service the population of the District in 2010 109,864 representing 2.7 per cent of the region's total population. Males population is 53,376 representing 48.7 per cent and females made up of 56,488 representing 51.3 percent. About 90.4 per cent of the population lives in urban areas. The sex ratio in the district is 94 males to every 100 females; while the dependency ratio in the district stands at 58 to every 100 people aged 15-64 years. With respect to migration, 70 per cent of the population are migrants.

Economic Activities: The economic activities in the municipality consists of agriculture, industry and commerce service. The industry and service sectors serves as the backbone of the economy because it employs majority the labor force. Agriculture employs about 13.5 percent of the population. Crop farming is predominant in the municipality and majority of crops produced by farmers include maize, cassava, tomatoes, onions, pepper and okro etc. Vegetables

like cabbage, carrots, green pepper, spring onions, cucumber, lettuce, 'Ayoyo' and 'Gboma' are also cultivated in the Municipality.

Educational Facilities: There are both private and public schools in the district. They comprise of Kindergarten, Primary, Junior high school and Senior high school. There are 661 educational facilities across the length and breadth of the Municipality of which 99 are Public Basic Schools and 562 Private Basic Schools. The Municipality has 1 Government Senior High School and 3 Private Senior High School as well as 1 Private University at Oyibi.

Health Facilities: The health facilities in the municipality consist of 9 Public Health facilities, 20 Private and 1 Quasi-Government facility. The public includes 6 health centers and 1 CHP compound at Seduase. There are 55 demarcated CHP Zones and 41 functional CHP Zones. Also in existence are pharmaceutical shops and herbal centers that complement these facilities. The most common disease in the municipality is Malaria followed by Upper Respiratory Infection, Anaemia and other sanitation and environmental diseases. The challenges faced the Health sector include poor access to health facilities, inadequate medical equipment/logistics, lack of Municipal Hospital, inadequate Doctors and nurses, inadequate staff accommodation, absence of Health Insurance Office for Kpone Health Centre to help in improving health care in the Municipality.

Water Supply: About 75% of the communities within the Municipality have access to potable water. In 2004, the Danish International Development Agency (DIDA) and Ghana Water Company established the Oyibi water company which are the two major contributing factors to the 75% achievement hence limiting water accessibility problem in the Municipality.

Sanitation: The district gets its support from the Greater Accra Metropolitan Area Water and Sanitation Project (GAMA-SWP) sponsored by the World Bank, has also helped in the increase of access to water in 30 Low- Income Urban Communities. The Municipal is fast developing

with people constructing new houses, hence the need to extend potable water to new developing areas. Also access to sanitary facilities in the District is generally appreciable.

3.2 Research Approach

The study's methodology was a blend of several approaches. As a result, the study incorporates both qualitative and quantitative research methodologies. These methods helped the investigation get the data it required to be a success. The quantitative method is hampered by the fact that it does not allow study participants to express themselves fully. Structured questionnaires are used to collect information from respondents. Qualitative methods are used to supplement the quantitative approach. Thus, the qualitative technique employed in this study allowed participants to communicate their views on sand winning and its influence on the environment, agriculture, employment, and household well-being more openly and in greater depth. As a result, the outcomes of the study can be substantiated by employing both quantitative and qualitative research techniques. Using a blended style of research helps to overcome the inherent shortcomings of each of the two research approaches.

In justifying the use of mixed method approach, Creswell (2009) states that using different sources and methods in the research process, helps the researcher to build on the strengths of each type of data and minimize the weakness of any single approach. Therefore, collecting and analysing both words and numbers in a single study allows the researcher to reveal the way in which people tend to understand the world around them. By combining both inductive and deductive thinking the researcher tends to base knowledge claims on realistic grounds (Creswell, & Plano-Clark, 2007). Mertler and Charles (2011) state that, through mixed methods, researchers can build a study based on the strengths of both qualitative and quantitative methods which may provide a more complete picture of a research phenomenon.

Creswell (2009) argues that mixed methods design can yield richer, more valid, and more reliable findings than evaluations based on either qualitative or quantitative methodologies alone.

3.3 Population and Sample Size

The research was carried out in two different towns (Nanoman and Kpone-Bawleshie communities). The population for the study was made up of members of the two communities. In the Kpone-Katamanso Municipal District, these two communities have been shown to be the most active in sand winning. In order to meet the study's goals, farmers and sand winners in the villages were chosen as the study's primary target demographic. Landowners and leaders from the two communities studied were also surveyed.

The Environmental Protection Agent, the Environment Department of the Kpone-Katamanso Municipal Assembly, and the Mineral Commission also provided input. As part of the study, a total of 110 sand winners, 110 farm owners, and 20 community leaders were surveyed. As a result, the study's sample size is 240 participants.

3.4 Sampling Technique

The study made use of stratified random sampling. Respondents from the study communities were sampled using stratified random sampling. A more accurate and proportional representation of the general public was made possible by breaking the population down into smaller, homogeneous groups of three. As explained by Leedy and Ormrod, (2005), stratified random sampling involves breaking up large populations into smaller subgroups. The study drew a representative sample of 240 people from the total population by using stratified random sampling. However, the research divided the study's intended audience into three distinct groups (sand winners, farmers and community leaders). The final step was to divide the total

sample among the three strata or classes that had been selected (i.e. A, B and C). Using the total of 240 respondents, the study was broken down into three unique groups: one hundred and ten (110) sand winners, one hundred and ten (110) farmers, and twenty (20) leaders of the communities under study.

Using purposive sampling approaches, the study gathered information from a variety of sources, including the Environmental Protection Agency, Kpone-Katamanso Municipal Assembly, and the Ministry of Agriculture and Rural Development. A researcher's deliberate selection of a relevant informant is known as "purposive sampling," sometimes known as "judgment sampling." To put it another way, the researcher decides what information should be gathered and then sets out to find people who can and will provide it through their own unique set of skills and experiences (Lewis & Sheppard, 2006).

3.5 Data Collection Instrument

The study relied on questionnaires (both open and closed-ended) to gather primary data from the field. Respondents in the two communities were asked to fill out this questionnaire. Respondents were able to freely contribute to the study because of the questionnaire's well-structured agreement on confidentiality and anonymity.

3.5.1 Validity and Reliability of the Study

Validity is a term used to describe the process through which a survey questionnaire's questions evaluate the idea under investigation (Terwee et al., 2007). After talking to the research supervisor, the validity of the questionnaire (instrument), particularly its face validity, was established. Double-checking the material to ensure it measured what it promised to measure was the way this was accomplished. If the results of a study are constant throughout time and

accurately represent the viewpoints of all the people surveyed, it is considered reliable (Burns et al., 2000). The Cronbach alpha was used to test the reliability of the questionnaire.

3.6 Data Collection Procedure

As a first step, the researcher sourced introductory letters for study communities and research organizations, such as the Kpone-Katamanso Municipal Assembly, the Mineral commission, and the Environmental Protection Agency. A relationship was developed between the researcher and the study respondents through constant follow-ups.

3.7 Sources of Data

Primary Data: First-hand knowledge gathered by the researcher in the field is considered a primary source of data. Primary data was gathered for this study's purposes. Primary data is critical to a study since it yields accurate and up-to-date information. These villages were studied using this strategy to get information on sand winning and how it affects agricultural and environmental sustainability.

Secondary Data: Data that has previously been collected and compiled is known as secondary data. Secondary data was useful to the study to identify what has been done in this field by other researchers, get to know the gaps and fill in such gaps by crafting the correct questions for the study. Such data was acquired from media, textbooks, articles, peer reviewed journals and company reports.

3.8 Data Analysis Technique

The raw data obtained from a research is useless unless it is transformed into information for the purpose of decision making. The data analysis involved developing summaries as well as the use of tables and charts to make meaning out of the raw data. Consequently, the following

steps were taken to analyse the data for the study. The data was edited to detect and correct, possible errors and omissions that are likely to occur, to ensure consistency across respondents. The data was then coded to enable the respondents to be grouped into limited number of categories. Statistical Package for Social Sciences (SPSS.v.21) was used in the processing of primary data that was gathered.

For the qualitative part of this study, the researcher used a thematic analysis. According to Frankel and Wallen (2003), data analysis entails synthesizing the bulk information obtained from diverse sources into a coherent description of the subject under investigation. According to Cresswell (2009), when a researcher gathers data in the field, he or she must make "meaning" of the data obtained. In this sense, the material must be classified into coherent pieces of information known as themes and codes by scholars. As a result, Cresswell (2009) offers four stages for academics to take when doing theme analysis. The study employed Cresswell's (2009) technique to theme analysis, as follows:

1. To begin, the researcher translated the bulk of the interview material from the speech recordings into written language to facilitate comprehension of the topics discussed with the participants.
2. The second stage entailed poring over the transcribed material in order to have a better understanding and appreciation for the topics under examination. Additionally, the researcher observed and recognized several significant points, particularly in places where respondents agreed or disagreed on a certain topic.
3. The third stage was to assign codes and create themes. The researcher painstakingly divided the text at this step before bringing forth the information's obvious significance.
4. The final stage was to interpret the numerous themes gleaned from the data. The researcher then evaluated the themes by providing a detailed description of the data and

comparing the findings to material gleaned from the literature. Following that, conclusions were reached.

3.9 Ethical Consideration

Respondents' participation in the study was entirely voluntary. Respondents could however opt out of the survey at any time during the research process as they saw fit (Clark-Kazak, 2017; Dooly et al., 2017). The researcher recognized all necessary authorities in order to avoid academic theft or plagiarism. Arrangement Forms for secrecy and anonymity were also provided.

3.11 Conclusion

Sand winning is a popular practice in Kpone-Bawleshie Municipal District, where Nanoman and Kpone-Bawleshie communities are located. Because of the high incidence of sand winning activities in the surrounding area, the researcher decided to focus their research in these specific locales. Research participants were mainly farmers and sand winners who lived in the study villages. Primary data were gathered through the use of questionnaires, both open and closed ended. The collected data was analysed using SPSS.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Introduction

The study's findings are discussed in this chapter. A summary of the findings is provided under the study's objectives. Percentages, charts, and graphs are used for quantitative data whereas narrative and content analysis formats are used to show qualitative data.

4.1 Demographic Characteristics of Respondents

Respondents were drawn from two communities namely Nanoman and Kpone- Bawleshie communities. In Table 1, most of the respondents sampled from the Nanoman Community were within the age range of 46-50 years (23.3%). Respondents between the ages of 41-45 and respondents aged 51-55 all recorded 18.3% of the total respondents. This is followed by respondents aged 56 years to 60 years (15%), 36-40 years (9.2%), above 60 years (8.3%) and respondents aged 30 to 35 years also representing the least with 7.5%.

On the other hand, most of the respondents from the Kpone- Bawleshie community were between the ages of 41 to 45 years (21.6%), 46-50 years (19.1%), 36 -40 years (17.5%), 51-55years (12.5%) and respondents above 60 years (12.5%). The least recorded ages were respondents between the ages of 56-60 years (9.1%) and respondents between the ages of 30 - 35 years (7.5%). In addition, majority of respondents who participated in the study from the Nanoman community were migrants (60.8%) compared to indigenes representing 39.2% whiles respondents drawn from Kpone- Bawleshie community were made up of migrants (57.5%). compared to indigenes representing 42.5%.

Moreover, majority of respondents in the Nanoman community have lived in the community for over 20 years (64%) indicating their extensive level of knowledge on the subject matter and extensive experience on the issue under study. With regards to the community member at Kpone- Bawleshie community, majority had have lived in the community for 1 -5 years (29.1%), 11-15 years (25%), 6-10 years (20.8%) and respondents who have lived in the community for over 20 years (15.8%). Respondents who have lived in the community between 16 years to 20 years recorded the least percentage of (9.1%). This also indicates that majority of respondents have enough information on the study topic and can inform the study with much information over the years.

Furthermore, in Table 1, among the respondents in the Nanoman community majority of them have Senior High School education representing 57.5% of the total respondents of study as against just 42.5% of respondents who have Junior High School education. On the other hand, majority of the respondents from the Kpone- Bawleshie community had their Secondary education (42.5%), Primary education (35.8%), and only 21.6% of respondents who have never been to school. The level of education of respondents in the communities also implies enough level of knowledge and clear understanding of the issue under study.

Majority of respondents sampled for the study from the Nanoman Community were males (62%), compared to 38% females. Similarly, majority of respondents sampled for the study from the Kpone-Bawleshie Community were males (86.7%), compared to 13. 3% females. This goes to show that there are more males involved in sand winning activities than there are women. Furthermore, in the Nanoman Community 41.6% of the respondents are not married, 29.1% were married whiles another 29.1% were widowed. With regards to the Kpone-Bawleshie Community, 45% of respondents were not married, 43.3% were married, and 7.5%

were divorced whiles 4.2% of the respondents were separated. Moreover, 44.1% of the respondents in the Nanoman Community were farmers, 34.1% were sand winners, 16.6% were traders whiles 5% were drivers. On the other hand, respondents from the Kpone-Bawleshie Community were mostly farmers (84.2%) and farmers (15.8). When asked how long they had been in their respective businesses, majority of the respondents from Nanoman Community said 11-15 years, 34.2% said more than 20 years, 16% said between 6 to 10 years whiles 7.5% said between 1 to 5. For respondents from the Kpone-Bawleshie Community majority representing 57.5% said 6-10 years, 23.3% said 16 -20 years whiles 19.2% said more than twenty years.

When asked their alternative source of livelihood, 68% of the respondents from Nanoman Community said they were traders, 22% said they were masons whiles 10% said they were electricians. For community members of Kpone-Bawleshie Community 48.1% said they were traders, 44.2% said they were drivers, 5.8% said they were electricians whiles the minority representing 1.9% were masons. Within the Nanoman Community, 52.5% of the households within the community had between 6-10 members whiles 47.5% had between 1-5 members. On the other hand, that of Kpone-Bawleshie Community had 41.7% of them being between 6-10 members, 30.8% of them between 1-5 members whiles 27.5% had above 10 members.

Table 1: Demographic characteristics of respondents

Characteristics	**Categories**	**Kpone-Bawleshie**	**Nanoman**	**Total**
Age of respondents of respondents	30-35	9	9	18
	36-40	21	11	32
	41-45	26	22	48
	46-50	23	28	51
	51-55	15	22	37
	56-60	11	18	29
	Above 60 years	15	10	25
	Total	**120**	**120**	**240**

Indigene or migrant	Indigene	51	47	98
	Migrant	69	73	142
	Total	**120**	**120**	**240**
Number of years in community	1-5	35	-	35
	6-10	25	-	25
	11-15	30	-	30
	16-20	11	43	54
	Above 20 years	19	77	96
	Total	**120**	**120**	**240**
Educational Level	Never been to school	26	-	26
	Junior High School	43	51	94
	Secondary School	51	69	120
	Total	**120**	**120**	**240**
Gender	Male	104	74	178
	Female	16	46	62
	Total	**120**	**120**	**240**
Marital Status	Never married	54	50	104
	Married	52	35	87
	Divorced	9	-	9
	Separated	5	-	5
	Widowed	-	35	35
	Total	**120**	**120**	**240**
Occupation of respondents	Farmer	101	53	154
	Sand winner	19	41	60
	Driver	-	6	6
	Trader	-	20	20
	Total	**120**	**120**	**240**
Number of years in occupation	1-5	-	9	9
	6-10	69	19	88
	11-15	-	51	51
	16-20	28	-	28
	Above 20 years	23	41	64
	Total	**120**	**120**	**240**

Respondents alternative source of livelihood	Trader	25	17	42
	Driver	23	-	23
	Electrician	3	5	8
	Mason	1	8	9
	Total	**52**	**30**	**82**
Number of members in respondents household	1-5	37	57	94
	6-10	50	63	113
	Above 10	33	-	33
Total		**120**	**120**	**240**

Source: Field Survey (2021)

4.2 Research Objective One: To determine the Perception to which sand winning activities contribute to environmental degradation.

This section sought to ascertain the extent to which sand winning activities contribute to environmental degradation. Therefore, questions pertaining to the objective were asked.

4.2.1 Sand Winners Acquisition of Land

Out of the 120 respondent from Nanoman community, 43% of the respondents said sand winners acquired their lands from chiefs, 38% of the respondents said individuals whiles 19% of the respondents said sand winners acquire their land from families. With respect to respondents from the Kpone-Bawleshie community, 58% of the respondents said sand winners acquired their land from individuals, 32% said chiefs whiles 11% of the respondents asserted that sand winners acquired their land from families. This goes to show that for Nanoman community, sand winners acquire their land from chiefs whiles those from Kpone-Bawleshie community acquired their lands from individuals.

Table 2: Sand Winners Acquisition of Land

Response	Nanoman	Kpone	Frequency
Individuals	38	58	47
Families	19	11	15
Chiefs	43	32	38

Source: Field Survey, (2021)

4.2.2 Change in Land Use Pattern

All 240 respondents were asked whether there had been a change in land use patterns. 37% of the respondents from the Nanoman said yes whiles 39% of the respondents from the Kpone-Bawleshie also said yes. Thus, majority of the respondents affirm that there has not been a change in land use patterns.

Table 3: Change in Land Use Pattern

Response	Nanoman	Kpone	All
Yes	37	39	38
Total	**120**	**120**	**240**

Source: Field Survey, (2021)

In an interview with the Chief Field Security Officer of the Minerals Commission of Ghana, Accra, it was revealed that sand winning activities can be started by a firm or an individual only by acquiring a permit from the Commission. There are two types of this permit: Surface Rights and Mineral Rights. The surface right is given by the chief and land owners whiles the assembly gives the right to win sand. It was revealed by the Commission that sand winning activities is a major livelihood activity undertaken in the study communities. However, the commission admitted it faced difficulty in monitoring their activities because majority of these sand winners are illegal and ran away whenever they get the hint of the visit of the Commission. The Commission therefore is unable to arrest such perpetrators despite continued efforts.

From the interviews conducted, Respondent One from the Kpone-Bawleshie community revealed that '*land use and land cover in the community has changed overtime as a result of sand winning activities in the area. They however indicated that, these changes were noticed in 2005 and is still ongoing'.*

Another Respondent from the Nanoman community added that, '*sand winning activities have been taking place in the community over ten (10) years now. They admitted that sand winning activities in the area is a great problem or challenge to the community and their environment'*.

Further, Respondent Two from Nanoman outlined that '*some of the effects of sand winning activities in the area include Deforestation, land degradation, water pollution, air pollution, destruction of farm lands or arable lands and soil erosion. Respondents form both communities expressed their disappointments in spite of the fact that regulatory authorities regulate sand winning activities in Ghana, though the negative effects of sand winning activities continue to persist in the communities'*.

However, another respondent from Nanoman stated that '*farming is still present in the community because without farming we cannot survive'.*

Figure 2: Picture indicating sand winning activities at Kpone-Bawleshie

Source: Field Survey, (2021)

4.3 Research Objective Two: To examine the effects of sand winning on farming activities.

The questions in this section were related to the second objective. Respondents were asked questions pertaining to the objective.

4.3.1 Effects of Sand Winning Activities on Agriculture

Cassava, plantain, vegetables and maize are some of crops cultivated in Kpone- Bawleshie and Nanoman communities. Sand winning activities is revealed to have affected agricultural lands a great deal according to respondents from the Nanoman community. First and foremost, they indicated that sand wining activities have reduced the farmlands of farmers in the two communities hence affecting the quantity of farm yield. This is evidenced by one of the respondents who stated that;

'My fam size was 2 hectors and I could farm on it to feed my family and even get some to sell to members of the community and other neighbouring communities for extra income but sand winning activities in the communities have reduced my farmland to half a hector accompanied by reduced farm yield'.

Another respondent stated that;

'Sand winning has affected farmers and farming activities because they planted crops like mango, cassava, maize which were produced in large quantities but nowadays due to low soil fertility they produce in small quantities which they cannot even sell. At first, when you have 3 cedis of cassava, a whole household consisting of 10-15 people can feed on that but now even two people cannot be okay with 5 cedis cassava'.

Another respondent stated that;

'Farmers are suffering because most of them cannot get access to land to cultivate because most of the land owners have given out their land to sand winners'.

Respondents from the Kpone-Bawleshie stated that erosion, loss of soil fertility, loss of farmlands and destruction of crops were some of effects of sand wining on farming activities.

Aside from the effects of sand winning on farming activities, they stated that soil fertility has reduced. According to the respondents, reduced farmlands, changes in land cover and reduced land size for crop production is inextricably linked to reduced crop yield. On this note, respondents were asked to indicate how much they were earning from the sale of the produce before land use changes and how much they earn in recent times in the wake of sand wining activities. Respondents indicated that their income levels from their farm produce have reduced drastically as compared to what they were earning in previous years. According to a respondent:

'I could earn almost 4000 cedis from the sale of my farm produce because my land was vast and the yield too was good but today, I manage to even earn 2000 cedis. Farming has become very difficult than it was before because soil fertility is now very low as compared to soil fertility before'.

Another respondent stated that;

'Some of us had to stop working because the land owners wanted to give out the lands to sand winners. We had to learn other businesses such as carpentry, mason, etc. so that we can be able to provide for our family members'.

Another respondent stated that;

'At first, when we have mango, cassava, maize, we were producing on large quantities but nowadays about 6-15 years down the lane, it is only what we consumer in our household that we can produce. We are not able to produce enough quantities to sell in large quantities which has affected farmers and residents'.

4.4 Research Objective Three: To explore the effects of sand winning activities on the wellbeing of local community.

This section discusses questions relating to the third objective of the study.

4.4.1 Negative Effects of Sand Wining

As shown in Table 4, the negative impact of sand wining on farming is high or more severe especially to individuals who are not sand winners but depend on the land cover for their means of livelihood. Through winning, these livelihoods are lost most of the time or changed. This is represented by the highest mean of 4.52. This is followed by the effects on education (2.02). The environment is also affected by sand winning immensely with its accompanying effects like deforestation, soil erosion, and loss of farmlands among several others (1.99). When income levels are reduced, households or families or even individuals are unable to afford three meals a day and that even if they do, it may not contain the adequate amount of nutrients needed for good health, growth and vitality. Respondents however mention effects of sand wining on health (1.89), nutrition (1.67) and income of community members (1.55). The effects on income and nutrition are noted to affect farmers in the study communities more than other individuals who engage in other means of livelihoods. Effects on tourism recorded the least mean of (1.54).

Table 4: Negative Effects of Sand Wining

Response	Kpone-Bawleshie (Mean)	Nanoman Mean)	All
Farming	2.358	2.1647	4.5227
Education	0.6566	2.0216	2.0216
Environment	1.4032	0.5897	1.9929
Health	0.3987	1.8971	1.8971
Nutrition	0.6432	1.0235	1.6667
Income	1.2584	0.2923	1.5507
Tourism	0.8974	0.6481	1.5455

Source: Field Survey, (2021)

4.4.2 Positive Effects of Sand Wining

In spite of the adverse effects of sand wining in communities and to Ghana and any other country at large, it was necessary that the study explored other positive effects or importance

of sand winning. Based on the means in (Table 5), majority of respondents agreed that sand winning provides raw materials for building and construction representing a mean of (4.22). This was followed by the agreement that sand winning helps in the provision employment for the youth in the two study communities also with the mean representation of (1.48).

Table 5: Positive Benefits of Sand Wining

Response	Kpone-Bawleshie (Mean)	Nanoman (Mean)	All
Material for building & construction	2.649	1.574	4.223
Work for youth	0.6957	0.7934	1.4891
Income for landowners	0.7882	0.6547	1.4429
Revenue for the assembly	0.3589	0.7978	1.1567
No benefit	0.5698	0.5021	1.0719

Source: Field Survey, (2021)

Land owners are not left out of the benefits of sand winning in the two study communities as respondents indicate that sand winners gain income from their sale of lands to sand and stone miners to gain income representing a mean of (1.44). As part of the benefits of sand winning, the activity serves as a source of income for the Assembly through licensing of sand wining companies among others with a mean of (1.15). The least recorded response from respondents with a mean of (1.07) showed that communities do not gain any form of benefits form sand winning activities in the area (Table 6).

4.4.3 Effects of Sand Wining on Health

According to respondents of the study, at least household members fall ill monthly and quarterly and are diagnosed mostly of malaria and sometimes diarrhea. Majority of respondents attribute these diseases to the pollution of the environment as a result of sand winning activity. Respondents further indicated that, treating household members of such environmentally caused diseases is expensive to treat. Most of the time, children and adults miss school and work for days to gain their health before resuming. This affects the education of children and

household income especially if the household head is the one affected. A respondent stated that;

'*Treating household members of diseases cost not less than 100 cedis which is about 15% of our household income. It is too much for my household to carry and need the government to do something about sand winning in my community or else, we will all die of hunger and poverty'.*

In conclusion, respondents revealed that the implication of sand winning activities on the health of community members for the past years is negative rather than positive.

Figure 3: Unclaimed mined site with stagnant water which breeds mosquitoes to cause diseases in the communities

Source: Field Survey, (2021)

4.4.4 Effect of Sand Wining on Food Security

The respondents in both communities were asked whether there was ever a time in the past 12 months when they were worried about not having enough food to eat because of reduced farm

yield, lack of money or other resources. With respect to respondents from the Nananom, 54% of the respondents said yes whiles 46% of the respondents said no. On the other hand, 30% of the respondents from the Kpone-Bawleshie said yes whiles 70% of the respondents said no.

Table 6: Effect of Sand Wining on Food Security

Response	Nanoman%	Kpone%	All
Yes	54	30	42
No	46	70	58

Source: Field Survey, (2021)

4.4.5 Effects of Sand Wining on Livelihoods and Household Incomes

When asked whether sand wining has affected their livelihoods and household incomes, 77% of the respondents from the Nanoman said yes whiles 23% of the respondents said no. On the other hand, 73% of the respondents from the Kpone-Bawleshie said yes whiles 27% of the respondents from the same community said no. This goes to show that, sand wining activities affect the livelihoods and household incomes of both communities.

Respondents from both communities added that, they used to grow crops without adding any fertilizer because the land was very fertile but in recent times, farmers have to purchase fertilizers to be applied to lands causing farmers to invest more to get their yield which affects their livelihood and income of farmers. Respondents from the Nanoman added that, land owners are paid better by sand winners than farmers who have rented their lands so recent times have seen more landowners taking their lands from farmers to give to sand winners so they can get more money. Respondents from the Kpone-Bawleshie asserted that, in some cases, farmlands may be occupied by growing crops but they have to be destroyed to allow sand winners to mine sand and stones because the owner of the land has given miners the right to do so.

Table 7: Effect of Sand Wining on Livelihoods and Household Incomes

Response	Nanoman	Kpone	All
Yes	77	73	75
No	23	27	25

Source: Field Survey, (2021)

4.4.6 Effect of Sand Wining Activities

The respondents in both communities were asked the effects of sand winning activities. Majority of them stated that *'sand winning affects the environment especially when it rains water does not flow into the right channel leading to damaged roads as a result of the digging. Also, it causes stagnant water which causes an unpleasant smell and breads mosquitoes leading to malaria. Sand winning has become a major problem to our farmlands.*

Another respondent stated that;

'Sand winning has reduced the number of farmers in the community. There was a case were a farmer was growing crops on the land and the owner told the farmer that he wanted to lease the land to sand winners.

Another respondent stated that;

'Sand winning leads to erosion, loss of soil fertility, loss of farmlands to sand winning activities and the destruction of crops. It has also led to environmental pollution as a result of the continuous digging which breeds mosquitoes any time it rains. It also causes environmental hazards. It further damages more roads which government has to waste further resources to get done.

However, one respondent stated that;

'Sand winning has positively impacted our community because it has brought about development.

4.5 Conclusion

This chapter analyzed data gathered from the field through the questionnaires and interview guide. Responses were grouped under each objective of the study and analyzed.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

In this chapter, the findings of the study are summarized, as well as the study's conclusion and suggestions. There were 120 sand winners, a hundred and ten (110) farmers, and ten (10) community leaders who participated in the study. Stratified random sampling and purposeful sampling were used in the study. In order to get primary data from the field, the researcher used questionnaires (both open and closed ended).

5.1 Summary of findings

The primary goal of this study was to investigate the effects of sand winning on agricultural sustainability in the Municipal District of Kpone-Katamanso. Specifically, the study focused on:

1. To investigate the perception to which sand winning activities contribute to environmental damage.
2. To examine the effects of sand winning on farming activities.
3. To explore the effects of sand winning activities on the wellbeing of the local community.

The investigation was conducted using a mixed methods approach. There were two communities where the study was carried out (Nanoman and Kpone-Bawleshie communities). The population for the study was made up of residents of the two communities. Two hundred and forty (240) respondents from both districts received questionnaires with twenty (20) respondents from both districts being interviewed. The Kpone-Katamanso Municipal District's highest concentration of sand winning activity led to the selection of these two localities in the district.

Research Objective One: To determine the perception to which sand winning activities contribute to environmental degradation.

First and foremost, we wanted to find out how much sand winning contributes to degrading the ecosystem. People in Kpone-Bawleshie said that the community's land use and land cover have altered over time because of sand winning. This alteration was first noted in 2005 and is continuing to this day. According to Nanoman survey respondents, sand winning activities have been going on for ten (10) years currently in the communities. To the community and the ecology, they acknowledged the issue of sand-winning as a major concern. Aside from deforestation, water pollution and air pollution, respondents from both communities said that sand-winning activities in their locations have had a negative impact on their land and water resources. Many people in both communities were disappointed that, in spite of the fact that regulatory authorities in Ghana regulate sand-winning activities, the negative impacts of sand-winning continue to affect their lives.

Research Objective Two: To examine the effects of sand winning on farming activities

Primary goal was to look how sand winning affected farming activity. According to the Nanoman people, sand winning operations have had a significant impact on agricultural fields. Primary among these findings is an impact on farm produce that has been caused by sand wining activities on framers' farmlands in both communities. Some of the effects of sand wining on farming activities were cited by respondents from the Kpone-Bawleshie region, including soil erosion, loss of cropland, and crop devastation. In addition to the impact on farming activities, they noted a decrease in soil fertility as a result of sand winning. According to the respondents, agricultural yields are intrinsically connected to diminished cropland, changes in land cover, and lower land area for crop production.

4. **Research Objective Three: To explore the effects of sand winning activities on the wellbeing of the local community.**

The study established that sand wining activities in both Nanoman and Kpone- Bawleshie communities have negative effects on the environments, community members' and farmers' livelihoods and wellbeing, their health and agricultural activities. This was much prevalent in the Nanoman community than it was in the Kpone- Bawleshie. Respondents from the Nanoman emphasized that, land owners are paid better by sand winners than farmers who have rented their lands. Thus in recent times, more landowners within the Nanoman community are taking their lands from farmers to give to sand winners so they can get more money.

5.2 Conclusion

More than 90% of the total respondents sampled for the study revealed that, sand winning activities in their communities have negatively affected their livelihoods. In these communities, commercial farming activities are undertaken and it is important to note that, sand winning activities have affected the land size of majority of farmers affecting their yield and income levels. Farmers used to grow crops without adding any fertilizer because the land was very fertile but in recent times, farmers have to purchase fertilizers to be applied to lands causing farmers to invest more to get their yield which affects their livelihood and income of farmers. This study sought to identify the environmental effects of sand winning on agricultural sustainability. It was revealed and concluded that, soil wining leads to loss or reduction in farmlands, reduction in soil fertility and soil erosion among others. This causes livelihoods to be lost and income levels of households to also reduce drastically. Therefore, soil wining if not properly regulated has a negative effect on agricultural sustainability.

5.3 Recommendations

1. The study recommends that government institutions in charge of regulating and monitoring winning activities in Ghana intensify their monitoring operations to ensure that illegal sand wining and poor winning activities are curbed to save the environment form being destroyed. This will also ensure that sand winners reclaim wined lands after operations to avoid pit holes and stagnant waters that may breed mosquitoes and cause diseases in winning communities.
2. Secondly, community members should also serve as "watch dogs" to ensure that illegal sand winning operators are removed from the communities because the government although has the responsibility of ensuring that all sand wining activities are legal and illegal operators brought to book, it is important that community members also must play a supporting role of protecting the resources and the environment of their communities.
3. The Environmental Protection Agency (EPA) must demarcate clearly lands for agricultural production and lands for sand wining activities. This will help ensure that farmlands are not converted for sand wining operations. This will help farming activities to continue to strive to feed families and to allow households to gain a means of employment or income.
4. Finally, the study recommends community members to diversify or have alternative livelihood sources. This will help families to continue to have a means of livelihood in spite of the harsh effects of sand wining in the communities.

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ANNEXES

ANNEX 1: Ethical Report

Annex 1.1 (Information Sheet, Participation Consent form and confidentiality agreement)

Consent form for participant

Having read the information sheet and the details of the study explained to me, my questions have been answered to my satisfaction, and that, at any point of misunderstanding or unclear information, I may ask further questions.

I agree to participate in this study under the conditions set out in the information sheet.

Signature……. Date……

Confidentiality Agreement

I……agree to keep confidential all information obtained concerning the "Environmental effects of sand winning on agricultural sustainability". I will not retain or copy any information involving the project.

ANNEX 2: QUESTIONNAIRE

INSTITUTE OF STATISTICAL, SOCIAL AND ECONOMIC RESEARCH (ISSER)
MASTER'S OF DEVELOPMENT STUDIES (2021/2022)
UNIVERSITY OF GHANA, LEGON

I am a Masters student with the Institute of statistical, social and economic research (ISSER) at University of Ghana, Legon. As part of our study, it is required of me to address a societal challenge hindering our pursuit for development. This questionnaire seeks to elicit information on "the effects of sand winning on agricultural sustainability in Nanoman and Kpone - Bawalashie communities in Kpone -Katamanso district". It is for an academic exercise purposely.

Please tick the appropriate answer

A. Demographic characteristics of respondents

1. Locality

a. Nanoman community [ ] b. Kpone- Bawalashie community [ ]

2. Gender

a. Male [ ] b. Female [ ]

3. Age ……

4. Are you an indigene or a migrant in this community?

a. An indigene [ ] b. Migrant [ ]

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

…….....

6. Educational level

a. Never been to school [ ] b. Primary [ ] c. Secondary [ ] d. Tertiary [ ]

7. Marital Status

a. Never married [ ] b. Married [ ] c. Divorced [ ] d. Separated [ ] e. Widowed [ ]

8.Occupation

a. Farmer [ ] b. Sand winner [ ] c. Driver [ ] d. Trader [ ] e. If other specify…….

9. Number of years you have been doing this work? ……

10. Do you have any other source of income aside the one stated above? If yes, kindly indicate…….

11. How many are you in your household?

a. 1-5 [ ] b. 6-10 [ ] c. Above 10 [ ]

B. ACQUISITION OF LAND FOR SAND WINNING

12. Do you own a land? a. Yes [ ] b. No [ ]

13. How is land acquired in this community?

a. Rent [ ] b. Inheritance [ ] c. Family Land [ ] d. Gift [ ] e. Buy [ ]

14. Who makes decisions on the sale or transfer of ownership of land in the community?

a. Chief [ ] b. Family head[ ] c. Royal family members[ ] Other (specify) ……

15. Does ownership of land translate to the right to use the land for what one wants?

a. Yes [ ] b. No [ ]

16. From whom do the sand winners acquire the land?

a. Individuals [ ] b. Family [ ] c. Chiefs [ ]d. Clan heads [ ] e. Don't know [ ] f. Other, specify.....

17. Has the land use pattern in the area changed since 2010?

a. Yes [ ] b. No [ ]

18. If yes, what was the initial land use pattern in the community?

a. Farming [ ] b. Trading [ ] c. Artisan [ ] If any, specify.....

19. What is the current land use pattern in the area?

……

20. How is land in the community acquired for sand wining activities?

……

….

21. How are the activities of sand winners regulated in the community?

……

……

……

C. EFFECTS OF SAND WINNING ON ENVIRONMENTAL DEGRADATION

22. Has there been a change in land-use or land cover in the community as a result of sand winning?

a. Yes [ ] b. No [ ]

23. Which year(s) did you notice this change?.....

24. For how long has the sand winning activities been going on in this community?

…….

25. Do you think sand winning is a problem for this community?

a. Yes [ ] b. No [ ] c. Don't know [ ]

26. What effects does sand winning have on the environment?

a. Deforestation [ ] b. Land degradation [ ] c. Water pollution [ ] d. Air pollution [ ] e. Destruction of farmlands [ ] f. Soil erosion [ ]g. If other, specify…….

27. Do you think there is an agreement regarding how sand winners should win the sand in this community?

a. Yes [ ]b. No [ ] c. Don't know [ ]

28. If there is an agreement, with which groups do they have that agreement?

1).....

2).....

.....

29. Do they do what the parties have agreed upon?

a. Yes [ ] b. No [ ] c. Don't know [ ]

D. EFFECTS OF SAND WINING ON AGRICULTURAL ACTIVITIES

30. What agricultural crops are mostly cultivated here?

a. Cassava [ ] b. Plantain[c. Vegetables[ ] d. Maize [ ] Other, specify.....

31. Are areas of cultivation or agricultural lands being lost to sand winning activities?

a. Yes [ ] b. No [ ]

32. If yes, what was your farm size?.....

33. What is your current farm size? …….

34. What effects does sand wining have on farming activities?

a. Erosion [ ] b. Loss of soil fertility [ ] c. Loss of farmlands to sand winning [ ]

d. Destruction of crops [ ] e. If other, specify…….

35. Has sand wining activities affected soil fertility for agricultural purposes in the area?

a. Yes [ ] b. No [ ]

36. If yes, how fertile is the soil now on a scale of 1-10

a.1-3 [ ] b. 4-6 [ ] c. 7-10 [ ]

37. How much did you earn as a farmer before sand winning affected your farming in this community?

……..

38. How much do you earn presently?

……

39. Has sand winning activities in the community affected your overall annual farm output?

a. Yes [ ] b. No [ ]

E. EFFECTS OF SAND WINNING ACTIVITIES ON THE WELLBEING OF LOCAL COMMUNITY MEMBERS WHOSE FARMING ACTIVITIES HAVE BEEN COMPROMISED DUE THE ACTIVITY.

40. Rank the following benefits of sand winning in order of importance? **1-Strongly important, 2-Important, 3- Neutral, 4-Less important, 5- Not important at all**

	1	2	3	4	5
Material for building & construction					
Work for youth					
Income for landowners					
Revenue for the assembly.					
No benefit					
Health Impact					

41. Please rank the following in order of severity of impact (negative) of sand winning on the lives of your household members? **1- Very severe, 2-Severe, 3- Neutral, 4-Less severe, 5-Not severe at all**

	1	2	3	4	5
Farming					
Education					
Environment					
Tourism					
Health					
Nutrition					
Income					

Other, specify.....

42. Please explain how your household is affected negatively by the 1st ranked negative effect?

.....

……

……..

EFFECT OF SAND WINING ON HEALTH

43. How often do any of your household members fall ill?

a. Weekly [ ] b .Monthly [ ] c. Quarterly [ ] d. Half yearly [ ] e. Yearly [ ]

44. What common disease are household members frequently diagnosed of at the hospital or health centre?

a. Malaria [ ] b. Diarrhoea [ ] c. Buruli ulcer [ ] d. Acute Respiratory Infection [ ]

e. Skin disease [ ] f. Any other, specify……

45. What is the likely cause?.....

46. When was the last time a member of your household got ill?

a. Within 7 days now [ ] b. Between 7 to 14 days [ ] c. Between 15 and 60 days [ ]

d. More than 3 months [ ]

47. How much did it cost member(s) to be treated?.....

48. What percentage of household monthly income did you spend on the illness?.....

49. Did household member miss school/ work due to illness?

a. Yes [ ] b. No [ ] c. Don't know [ ]

50. For how many days did household member miss school / work?

a. Less than 3 days [ ] b. 3 to 7 days [ ] c. More than 7days [ ]

51.What is the likely cause of this disease?.....

52. In your own estimation what is the impact of sand winning on community health for the past 5 years?

a. Positive [ ] b. Negative [ ] c. No impact [ ] d. Don't k n o w [ ]

53. If negative, in what ways does sand winning affect the health of this community negatively?

……

……

…….

EFFECTS OF SAND WINING ON FOOD SECURITY

54. In the last 12 months, was there a time when you were worried about not having enough food to eat because of reduced farm yield, lack of money or other resources?

a. Yes[ ] b. No [ ] c. Don't Know [ ]

55. During the last 12 months, was there a time when you were unable to eat healthy and nutritious food because of lack of reduced farm yield, lack of money or other resources?

a. Yes [ ] b. No [ ] c. Don't Know [ ]

56. During the last 12 months, was there a time you had to skip a meal because there was poor farm yield or lack of money?

a. Yes [ ] b. No]] c. Don't Know [ ]

EFFECT OF SAND WINNING ON LIVELIHOOD AND INCOME

57. Has sand winning activities in the community negatively affected your livelihood in any way?

a. Yes[ ] b. No [ ] c. Don't Know [ ]

58. If yes, please indicate

……

…….

59. What was your main source of livelihood before it was negatively affected by sand winning?

a. Farming [ ] b. Trading[ ] c. Artisan[ ] If other, specify.....

60. What proportion of the community members were engaged in these livelihood activities?

.....

E. INTERVENTIONS

61. Are the authorities (DAs/EPA/Community Health etc.) aware of the health hazard of the sand winning activities in this community (if any)?

a. Yes [ ] b. No [ ] c. Don't know [ ]

62. What are some of the measures taken to remedy these adverse effects of sand winning?

……

…….....

.....

Thank you

APPENDIX 2: INTERVIEW GUIDE FOR SAND MINERS

Appendix 2: Interview Guide the effects of sand winning on the environment and agricultural activities

3. Please give me a brief history about sand winning in Kpone-Katamanso Municipal Assembly.

4. Is sand winning activities in this community regulated? a. Yes [ ] b. No [ ]

5. If yes, briefly describe it .....

6. How many people are in this business? (Estimate)

7. Are sand winners licensed?

8. Which organisation is responsible for the licensing of sand winners?

9. Are sand winning activities in the municipality monitored?

10. Which institution is responsible for the monitoring of sand wining activities?

11. How is land reclaimed after winning activities/

12. Is land reclamation mandatory for all sand winners?

13. Do sand winning contractors make deposits against reclamation?

14. How many trips of sand on the average are carried each day?

APPENDIX 3: INTERVIEW GUIDE FOR THE ASSEMBLY

Appendix 3: Interview Guide the effects of sand winning on the environment and agricultural activities

1. Title of respondent.....

2. Please give me a brief history about sand winning in Kpone-Katamanso Municipal Assembly.

3. Does your Institution have a framework for guiding the activities of Sand winners?

a. Yes [ ] b. No [ ]

4. If yes briefly describe it.....

5. How do you ensure that contractors work within the framework?

6. How do you ensure that Land owners lease land for sand winning within the frame work provided?.....

7. Do contractors make deposits against reclamation?

Yes [ ] No [ ]

8. If yes, how much?.....

9. Has there been cases of reclamation by a) Contractors b) District assembly?

10. Do you think the deposit is sufficient? Yes [ ]. No [ ].

11. If no, how much will you suggest?.....

12. How many people are in this business? (Estimate)

13. How many trips of sand on the average are carried each day?

14. What are some of the problems your Institution encounters with the contractor's/sand winners?.....

15. What measures have been put in place to address these problems?.....

16. What are the benefits you're as the Assembly derives from these activities?

17. What are the effects of these activities on the socio-economic life of households especially farmers?

18. How is your Outfit/Institution addressing these problems?

19. Considering the benefits against the effects of these activities, would you say it is still worth allowing these activities? (Explain your answer)

APPENDIX 4: INTERVIEW GUIDE FOR THE ENVIRONMENTAL PROTECTION AGENCY AND MINERALS COMMISSION

Appendix 4: Interview Guide the effects of sand winning on the environment and agricultural activities

1. Title of respondent.....

2. Please give me a brief history about sand winning in Kpone-Katamanso Municipal Assembly.

3. Does your Institution have a framework for guiding the activities of Sand winners?

4. Yes [ ] b. No [ ]

5. If yes briefly describe it.....

6. How do you ensure that contractors work within the framework?

7. How do you ensure that Land owners lease land for sand winning within the frame work provided?.....

8. Do contractors make deposits against reclamation?

Yes [ ] No [ ]

9. If yes, how much?.....

10. Has there been cases of reclamation by a) Contractors b) District assembly?

11. Do you think the deposit is sufficient? Yes [ ]. No [ ].

12. If no, how much will you suggest?.....

13. How many people are in this business? (Estimate)

14. How many trips of sand on the average are carried each day?

15. What are some of the problems your Institution encounters with the contractors'/sand winners?.....

16. What measures have been put in place to address these problems?.....

17. What are the benefits your Institution derives from these activities?

18. What are the effects of these activities on the socio-economic life of households especially farmers?

19. How is your Outfit/Institution addressing these problems?

20. Considering the benefits against the effects of these activities, would you say it is still worth allowing these activities? (Explain your answer)