



ENVIRONMENTAL EFFECTS OF ARTISANAL MINING ON COCOA FARMING,
AND THE INTERACTIONS BETWEEN MINERS AND COCOA FARMERS IN
OBUASI DISTRICT, GHANA

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EMMANUEL AKOMIAH DARKO-AMPEM

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Major:

AFES

Members of the Examining Committee:

Helena Perez Nino

Oane Visser

The Hague, The Netherlands

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Disclaimer:

This document represents part of the author's study programme while at the International Institute of Social Studies. The views stated therein are those of the author and not necessarily those of the Institute.

Inquiries:

International Institute of Social Studies
P.O. Box 29776
2502 LT The Hague
The Netherlands

t: +31 70 426 0460
e: info@iss.nl
w: www.iss.nl
fb: <http://www.facebook.com/iss.nl>
twitter: [@issnl](https://twitter.com/issnl)

Location:

Kortenaerkade 12
2518 AX The Hague
The Netherlands

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List of Acronyms

AGC	Ashanti Goldfields corporation
GDP	Gross Domestic Product
COCOBOD	Ghana Cocoa Board
MNC's	Multinational Corporations
EIA's	Environmental Impact Assessments
CSR	Corporate Social Responsibility
SSM	Small scale mining
EPA	Environmental Protection Agency
IMCIM	Inter-Ministerial Committee on Illegal Mining
OECD	Observatory of Economic Complexity
ASM	Artisanal and small-scale mining
UN	United Nations

Abstract

This study explored the environmental impact of artisanal mining on cocoa. Production in the Obuasi Municipal District of Ghana through a qualitative approach.

Detailed interviews and discussions were conducted with five cocoa farmers, 5 miners, a local community leader, a policymaker, and a cocoa Extension officer to gain insights into how mining activities affect both cocoa farming and the surrounding community.

The findings revealed that although artisanal mining offers certain economic benefits, it significantly harms the environment and cocoa production. One of the most striking observations from field work is that outright conflict between miners and farmers is not always the dominant theme. Rather, there are often forms of collaboration between them, particularly in cases where farmers, faced with declining cocoa yields, agreed to willingly sell their lands to illegal miners, whereas many farmers enthusiastically engage with illegal miners under specific conditions for quick income.

Major issues include deforestation, soil erosion, water contamination, and the destruction of cocoa farms. These environmental problems not only reduce cocoa yields but also jeopardize farmers' livelihoods, creating social and economic instability in the area.

The research also uncovered tensions between miners and farmers over land use, along with concerns regarding environmental justice.

This study adds valuable insights into the local effects of artisanal mining on agriculture, emphasizing the need for it. Environmental sustainability and community welfare over economic gains. It calls for improved resource management and the creation of policies that balance mining activities with the protection of agriculture in affected regions.

Relevance to Development Studies

In conducting this research, I aim to contribute to development studies by examining how artisanal mining impacts environmental sustainability, Community Relations and agricultural livelihood of farmers in the Obuasi Municipality.

Understanding these dynamics is critical for the crafting of policies that balance economic interests with environmental protection, and ultimately promoting sustainable development in resource-dependent country like Ghana.

Keywords

Galamsey; Illegal Mining; Cocoa Farm; environmental; Artisanal.

Chapter 1

What this Study is all About

1. Introduction

In the recognizable Obuasi municipal district of Ghana sits a 70-acre cocoa farm owned by Madam Gyamfua a widow in Tutuka a suburb of Obuasi. This once thriving cocoa farm boasting of nearly 6000 cocoa trees was not just a source of survival for Madam Gyamfua but also a cherished legacy intended for her children. Madam Gyamfua most of her time visited her farm which is healthy with strong cocoa trees, green leaves and green and yellowish cocoa fruits of which she cared for it with all passion and enthusiasm. However, illegal gold miners have ruined her farm leaving pit holes and only a few trees standing without hope of survival. Madam Gyamfua now faces the daunting task of rebuilding her life amidst the ruins of her once prosperous cocoa farm the laws of nearly 6000 trees have stripped her of a vital income source, leaving her struggling to support her family. Her dream of passing down the farm to her children now seems distant and filled with uncertainty.

The destruction caused by illegal mining has left deep scars on the community, the soil once fertile and bountiful is now contaminated with toxic chemicals used in gold extraction, rivers and streams that once provided clean water are now polluted posing health risk to the residence wildlife that thrive in the serene surroundings has dwindled and further disrupting the ecosystem. Efforts to combat illegal mining have met with challenges, limited resources and enforcement capabilities hinder the ability of local authorities to effectively address the issue (Hilson, Hilson and Pardie, 2007).

The environmental damage produced by these miners extends beyond farming, causing many neighbours to quit their homes and livelihoods. The consequences of illegal mining in this region go beyond the urgent need for protective measures to safeguard both the environment and the communities' dependent on it (Hilson, Hilson and Pardie, 2007).

Study seeks to identify the Environmental effect of artisanal mining in cocoa growing areas in The Obuasi Municipality of Ghana. To understand the effect of this artisanal. Mining on Madam Gyamfua's cocoa farm and its environs, there is the need to know the background of the municipality, the history of cocoa and illegal mining in Ghana.



Figure 1: cocoa farm before galamsey



Figure 2: A farm after galamsey

1.1. Background of Obuasi Municipality

Located in Ghana's Ashanti Region, Obuasi municipality, boasts centuries of rich history. Originally the territory of indigenous people, the region was well known for its rich wildlife and thick forest. The discovery of gold in the region significantly influenced its historical trajectory, drawing attention to the shaping of its developments (Oppong and Oppong, 2009).

The British colonizing the Gold-Coast in 19th century marked a pivotal period for Obuasi. The colonial government along with the European companies extensively exploited the regions' gold resources. In 1897, the establishment of the Ashanti Goldfields corporation (AGC) led to large scale mining operations transforming Obuasi into a bustling mining hub and attracting labor from various parts of the country and beyond (Cobbinah and Amoako, 2018).

Following Ghana's independence in 1957, the government took over many mining operations which obviously continue to thrive as this is a major gold-producing area that significantly contributes to the national economy (Hilson and Potter, 2005). However, the town faced numerous challenges including environmental degradation, conflicts and labour disputes. In recent times efforts have been made to diversify Obuasi's economy beyond mining. Investments in agriculture, education, and infrastructure development were initiated by the private sector and local government (Gwangndi, Muhammad and Tagi, 2016).

The introduction of modern technologies and practices in mining has improved efficiency and reduced environmental impact (Moreau et al., 2021). Today, Obuasi is home to several educational institutions, healthcare facilities, and commercial enterprises, contributing to its growth and modernization. Obuasi is not only known for its mining heritage but also for its vibrant cultural life, the town hosts numerous festivals and events celebrating Ashanti traditions and customs. The local population is well known for its warmth and strong feeling of identity. The inhabitants of Obuasi are strong and hopeful about how the future holds for their territory and community despite the difficulties presented by illegal mining and economic changes since the continuous menace shapes them. Due to the mining sector, Obuasi municipalities' population has seen notable increase throughout the years. According to these scholars, in most recent estimates, the municipality boasts 175,043 residents (McQuilkin and Hillson 2016). There are many ethnic groupings in this varied population however, the Ashanti people predominate. The excess of workers from all parts of Ghana and abroad has helped Obuasi Municipality to create a cosmopolitan town with rich forest reserves vital for primary environmental balance and maintaining biodiversity.

Notable reserves include the Apamprama forest reserve, which is home to diverse flora and fauna (Oppong and Oppong, 2009).

These forests not only support biodiversity but also provide resources for local communities. The area is also crisscrossed by several rivers, including the Ofin and Jima rivers, which are essential for agriculture, fishing, and domestic use. Gold extraction has remained the cornerstone of Obuasi for many years now. The Obuasi gold mine, operated by AngloGold Ashanti, remains one of the biggest and oldest mining company in Ghana. This mine has historically been a significant revenue and employment generation source for Ghana (Oppong & Oppong, 2009). However, developmental and social effects of large-scale mining projects have caused some worries. Apart from mining, cocoa growing is a major economic endeavor in Obuasi municipality. Growing cocoa which is Ghana's top export crop, is perfect for the rich ground and mild temperature in the country. A lot of families make their living from growing cocoa (Hilson & Potter, 2005). Aging farms, lack of access to new farming methods, and competition from illegal mining operations provide difficulties for the business.

Local name for illegal small scale or artisanal gold mining "*Galamsey*" has become a major problem in Obuasi municipality. Their actions not only damaged the surroundings but also compromised local population, health and farmers means of livelihood (Dery Tuokuu et al., 2020). Government intervention, community education and mining rule enforcement have been part of attempts to reduce galamsey. However, the problems remain

unchangeable. Among Obuasi's most urgent problems is the environmental damage caused by illegal mining operations. Local ecological and community livelihood has suffered from deforestation, water pollution and land degradation. In response, projects aimed at encouraging environmentally friendly mining methods and environmental rehabilitation have begun (Edible at al., 2020)

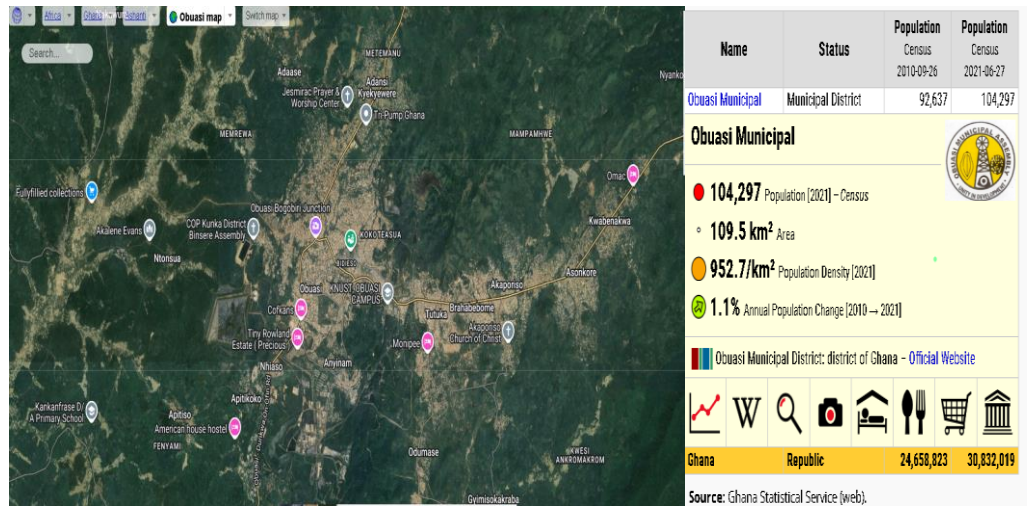


Figure 3: Satellite view of Obuasi

1.2. Background of Cocoa Farming in Ghana

The history of cocoa in the country is traced to the 19th century, when the cocoa bean was first introduced to Ghana. Tetteh Quarshie, A Ghanaian blacksmith, is often credited with bringing cocoa beans from Fernando Po (now Bioko Island, Equatorial Guinea) in 1879. Upon his return, he planted the beans on his farm in Mampong, Akwapim, and successfully cultivated cocoa. This marked the beginning of cocoa farming in Ghana, which would later become a cornerstone of the country's economy (Kuusaana, Adu-Gyamfi & Dankwa, 2021), (Kuusaana, Adu-Gyamfi and Darkwa, 2021)

In early 20th century, cocoa farming quickly spread throughout the southern regions of Ghana, particularly within the Eastern, Ashanti, Central, and Western regions. The favourable climatic conditions and fertile soils in these areas provided an ideal environment for cocoa cultivation. By 1911, Ghana (The Gold Coast then) had become the largest producer of cocoa in the world, a position it has held for several decades (Grier, 1981).

The expansion of cocoa farming was facilitated by the British colonial administration, which encouraged the cultivation of cash crops to boost the colony's economy. Infrastructure improvement, such as the construction of railways and roads, further supported

the growth of the cocoa industry by improving access to markets and reducing transportation costs (Grier, 1981).

Cocoa quickly became the most important export commodity in Ghana, significantly adding to Ghana's GDP and foreign exchange earnings. The cocoa industry played vital part in forming the economy of Ghana, providing employment and income for millions of stakeholder farmers. By the mid-20th century, cocoa farming had become deeply embedded in the socioeconomic fabric of rural Ghanaian communities (Amanor, 2010).

Following Ghana's independence in 1957, the cocoa industry faced several challenges. Fluctuating global cocoa prices, disease outbreaks (such as swollen shoots virus), and political instability affected population levels. Additionally, the government's effort to control the sector through establishment of the Ghana cocoa marketing board (now COCOBOD) and price controls sometimes led to inefficiencies and reduced incentives for farmers (Vigneri, 2008).

In recent years, the government of Ghana has implemented various measures to revitalize the Cocoa sector. Initiatives aimed at improving productivity include the distribution of high yielding and disease resistant cocoa varieties, provision of extension services, and support for sustainable farming practices. COCOBOD has also introduced programs to enhance the quality of Ghanaian cocoa, which is renowned for its premium quality on the international market (Kolavalli and Vigneri, 2011).

Ghana remains one of the leading producers of cocoa in the world, second to Cote d'Ivoire. The cocoa sector continues to be a vital part of the national economy, contributing significantly to export revenues and rural livelihoods. Efforts to ensure sustainable cocoa farming practices are ongoing, with the focus on addressing child labour issues and the effect of climate change on cocoa production (van Vliet et al., 2021).

TYPES OF MINING IN GHANA

1.3. Large-Scale Mining (Legal)

Mostly run by multinational corporations (MNCs), large scale underground mining is essential for the global economy and extensively invests in advanced technology and comprehensive infrastructure. Although these activities are basic in providing essential minerals, they also generate major environmental and socioeconomic issues. These mines must complete thorough environmental impact studies (EIs) before starting activities. By means of

these evaluations, possible effects on local ecosystems, water resources and communities are evaluated, therefore enabling the discovery of mitigating techniques (Hilson, 2012). Regulatory authorities established these guidelines, typically in cooperation with foreign companies. Protectors of workers depend on rigorous adherence to safety standards. Often using safety management systems compliant with international safety standards, such as ISO 45001, MNC's follow training programs and regular audits help to guarantee ongoing updating of safety precautions and follow policies aiming at reducing occupational mishaps (Smith et al., 2019). Usually involving thousands of personnel. Large scale mining activities offer notable job opportunities. For nearby towns, this can result in direct financial gains like higher household earnings and local business expansion. Many MNC's participate in Corporate Social Responsibility (CSR) initiatives, making developments in nearby towns through road, healthcare, and educational projects including building schools. This involvement seeks to establish good rapport with the local people and minimize resistance to mining operations (Smith, et al., 2019). Large scale mining has significant environmental effects notwithstanding legal systems. Land clearing from mining activities causes habitat damage and affects biodiversity and local species.

Moreover, water pollution from mining sites seriously disturbs aquatic ecosystems and can compromise drinking water supplies for nearby towns (Hillson, 2012). Underground mining activities energy intensive character helps to generate greenhouse gases. Attempts are underway to switch to greener, more sustainable methods, including renewable energy sources and putting in use environmentally friendly technologies. One main engine of national and local economies can be large-scale underground mining. Taxes and royalties bring money for which public services and infrastructure can be reinvested. However, depending too much on mining can lead to economic weaknesses, especially in areas lacking diversification of their economy (Bebbington et al., 2018). While community development, investments and job creation help to improve local living conditions, undesirable social effects, including land displacement, social inequality, and conflict (Amoah et al., 2019). Large scale mining activities and its long-term sustainability is still a major issue since environmental awareness raises stakeholder's expectations for responsible behaviour (Duncan et al., 2021).

1.4. Small scale legal surface mining

Small Scale Mining (SSM) is the practice of small entrepreneurs or cooperatives who lawfully acquired licenses from government agencies. Local economies depend on this industry, especially in underdeveloped areas where formal employment possibilities could be few. Although usually running under little capital, SSM is nonetheless, important in offering

livelihoods sophisticated, technologically advanced frameworks beyond those of large-scale mining. Small scale miners frequently employ hand labour and basic tools including shovels, picks and pans in their artistic methods. Local communities can use these methods since they demand much less effort and can be started. With Little capital (Wahab & Abou, 2019). These techniques limit production capacity and efficiency, even if they let for flexibility and reduced running expenses. Small scale businesses may thus find it difficult to compete with large scale mining companies or satisfy more demand in the market (Hentschel at all 2003). Many people in rural areas depend critically on small scale mining for work, it can improve household incomes and boost local economies hence creating employment for family members (Basu et al., 2020).

In areas like Obuasi Municipality with few alternative economic prospects, this job, according to Amoa et al., is usually quite important. Many in this industry labour under unofficial employment contracts. This can result in risks including lack of job security, limited access to social benefits, and exposure to dangerous working conditions (Amoah et al., 2021). Given their modest scale, these activities can cause notable damage to the land. In poorly controlled mining operations, habitat destruction, soil erosion and deforestation might result, and lack of sophisticated technologies and best practices could aggravate these problems (Morrison and Cavanagh, 2017). Though some small-scale miners understand the need of sustainable practices, many lack the means or skills to use them successfully. This disparity might cause ongoing environmental damage that might compromise local ecosystems and biodiversity. Whereas SSN stimulates and generates employment, and helping to support low local markets, the effects on the environment could compromise food security and agriculture. From mining excess, soil erosion and water contamination can compromise agricultural output and access to pure drinking water (Amoah et al., 2021).

The competition for land and resources between small scale miners. And local farmers can lead to social tensions and conflicts. Disputes may arise over land use, exacerbating existing inequalities and potentially leading to violence or displacement (Kojima, 2022). The acquisition of land for small scale legal surface mining typically involves several steps which may vary depending on the country's legal and regulatory framework. Small scale miners must apply for permits or licenses from the relevant government authorities before they can begin their operation. This usually entails turning in papers proving financial capability, compliance with legal criteria including environmental impact assessments (EIA's), and verification of compliance. Authorities might have set aside mining sites to strike a compromise between Environmental Protection and development. miners must find and apply for rights on these assigned areas. One must interact with nearby populations very actively, particularly

if the area is typically owned or used for agriculture. Miners must engage with local officials and get permission from landowners (Kojima, 2022).

Obtaining the social license usually depends on building a rapport with other towns, which might include paying compensation or perks for land use. Should the land be held by people or groups, miners may bargain for formal agreements to secure land access. This may involve compensation, revenue sharing arrangements or other benefits to the landowners (Hentschel et al., 2003).

In some cases, miners may lease land for a specific period outlining the terms of use obligations and any compensatory arrangements. Miners must comply with all local, regional and national regulations regarding land use and mining operations. This also involves obtaining the necessary environmental permits and observing safety and health standards. In regions where land rights are contested, small scale miners may face challenges from other land users such as farmers or indigenous communities. It's essential for miners to resolve these conflicts amicably to avoid legal disputes and community backlash (Amoah et al., 2021).

1.5. Small Scale Illegal Mining Practices Operation (*Galamsey*)

In Ghana, this form of mining, often conducted secretly, has become widespread due to various socioeconomic factors, especially poverty. Lack of employment and the lure of potential quick wealth. Although *galamsey* activities provide economic opportunities, they're associated with significant environmental degradation, land conflicts, and social tensions in local communities. Below is a detailed expansion of how these *galamsey* operations happens Teschner, (2012).

The daily operations of *galamsey* teams are labour intensive and dangerous, often involving the use of rudimentary tools such as shovels, picks and pans. The miners work long hours, starting at dawn and continuing until late in the evening. Under hazardous conditions. They take large pits, risking caverns, and often use. Highly toxic chemicals like mercury or cyanide to separate gold from soil. These chemicals pose significant health risks to the miners and also contaminate local water bodies, impacting the health and livelihoods of surrounding communities. Miners strategically choose locations far from their home villages or operate on farmland. When the owners are absent to avoid confrontation, the mining process continues for weeks or even months until the gold deposit is exhausted. During this time, the miners destroy significant portions of the farmland, leaving behind large pits and degraded soil, which makes the land unsuitable for future agricultural use (Teschner, 2012).

According to Osman et al., (2022), Artisanal miners, particularly those engaged in *galamsey* or illegal small-scale mining, follow a routine driven by the informal and often dangerous nature of their work. Their daily operations begin early in the morning, usually at first light, as miners gather in small groups to make their way to remote mining sites. These sites are often located in forested areas or near rivers where they believe gold deposits lie. Moreover, many operate without proper legal oversight, so their movements and activities are often secretive to avoid law enforcement. Once they reach the site, Miners prepare their rudimentary tools, which typically include pickaxes. Shovels and buckets. The equipment they use is basic and inexpensive, reflecting their limited access to capital and technology. They also bring along pans for washing gold and sluice boxes, which are simple devices made from wood or metal that help separate heavier gold particles from the lighter soil and gravel. In more mechanized *galamsey* operations, miners may use locally manufactured or imported excavators to dig larger pits quickly (Osman et al., 2022).

On the word of Rajae et al (2015), the mining process begins with the excavation of the earth. If they're working on a hard surface, miners use pickaxes to break the soil before shovelling it into buckets or wheelbarrows. In softer soil or sedimentary deposits which are close to rivers, miners search directly into the earth or riverbeds for gold bearing sites. Once enough material has been gathered, miners use gold panning, a technique by which soil and sediment are mixed with water and spun around in a pan to separate gold particles. Gold particles which are heavier than other sediment components are found using this basic yet efficient approach, where the gold settles near the bottom of the pan. In more advanced operations, miners separate gold using sluice boxes in areas where water runs over sediment. The lighter objects are swept away by the flowing water. As the sediment is dumped into the sluice box. The heavier gold particles are caught in ripples at the bottom of the box. Mercury may also be used by some organizations during the last phases of processing. poured over the rich gold sediments. mercury binds with the gold particles to create an amalgam. After heating this mixture, the mercury evaporates and pure gold results.

Moreover, the process, though effective, poses severe health and environmental risks due to mercury exposure and contamination of local water sources. Miners work in shifts, often without protective gear, and continue these operations until dusk, the work is gruelling and dangerous, particularly in areas where miners dig deep pits or tunnels without structural reinforcement, risking cave-ins. Once the day's extraction is complete, miners gather their findings, dividing any gold discovered among the group members based on pre agreed terms. Miners often face long days of manual labour with uncertain returns, and their activities pose significant risks to the environment, the surrounding agricultural lands, and

their health. Despite the hardships, they continue these operations daily, driven by the potential for financial gain in an otherwise impoverished economic context.

Accordingly, Rajae et al., (2015) thinks the first stage of *galamsey* involves scouting for potential mining sites, often on agricultural land, particularly cocoa farms. These miners look for signs of gold deposits, which may involve illegal exploration techniques. Farmland, especially those with rich mineral deposits, are prime targets. The initial marking of Land is done in secrecy, often without the knowledge or consent of landowners. Scouting also involves identifying areas with minimal oversight from authorities, thus ensuring that operations can proceed with little risk of immediate intervention.

Furthermore, once gold is discovered, miners may approach the landowners, often a farmer, to negotiate informal access to the land. These negotiations may lead to informal agreements that grant the miners permission to operate in exchange for immediate cash compensation or a share of the mining profits. While this may seem like a financial opportunity for the farmer, it often results in the destruction of the farmland. These agreements are often verbal and lack formal documentation, making it difficult for farmers to seek legal recourse if disputes arise later. The potential for significant damage to the land is high, but farmers driven by short term financial need may consent.














They continue to say, after securing informal access, miners begin excavating the land. They dig large, deep pits to access the gold bearing layers beneath the surface. These pits, often several meters deep, are left open, leading to significant topsoil destruction and environmental degradation. Temporary mining setups are constructed near the site, and the miners begin processing the extracted soil using rudimentary tools such as pans, shovels, and sluice boxes. The use of toxic chemicals such as mercury or cyanide to extract gold is common, leading to contamination of nearby water sources. The mining continues until the deposit is exhausted, which can take weeks or months depending on the yield.

Also, in cases where the mining site proves to be lucrative, miners may negotiate long term leases with farmers. This establishes a more formal, though still unofficial relationship where the farmer receives periodic compensation or shares in the profits. such arrangements often entangled farmers and the illegal mining ecosystem, making them reluctant to report these activities to authorities. This dynamic creates complex socioeconomic relationships where both parties depend on each other for financial gain at the cost of environmental sustainability and agricultural Productivity (Rajae et al., 2015).

1.5.1. Tools used in small scale mining.

The table below shows display the tools used by small scale miners during operations.

Table 2: Small scale mining tools

	Tools. Used in small scale mining.
	The Pickaxes are used for breaking and loosening soil or rock.
	Shovels are used for digging and moving material.
	Hammers are employed for breaking rocks or hard soil.
	Sledgehammers are used for more heavy duty rock breaking.
	Pans are used for Gold panning to separate gold from other materials.
	Using water sluice boxes channels water through a system to capture heavier materials like gold, allowing lighter materials to wash away.
	Crushers, manual or small mechanized crushers help break down larger rocks into smaller pieces for easier processing.
	Buckets are often used for transporting water to the processing sites.
	Hoses facilitate the movement of water, often critical in washing materials during processing.
	protective gear, which may include gloves, boots, goggles, and sometimes helmets to protect Miners from injuries.
	Dust masks are worn to protect Miners from inhaling dust and harmful particles still working.
	Wheelbarrows are used for transporting materials from the mining site to processing areas.
	Flashlights or headlamps are used for underground or low light conditions, allowing miners to see while they work.

Source: Table created based on tools found during field work

1.5.2. *Galamsey* Operations, Age and gender dynamics

According to Mensah and Bukari, (2024), *Galamsey* operations are dominated by young men, typically aged between 18 and 35 with few above 35 years. These individuals are often in the prime of their working life. That are unable to find formal employment due to limited opportunities in rural areas. Many of these young men are drawn to illegal mining as it offers a higher and faster return on labour compared to traditional agriculture, particularly cocoa farming, which requires patience and long-term investment. The promise of immediate financial rewards. Gold mining often overshadows the risks involved, such as the dangers of cave-ins, exposure to toxic chemicals, and potential legal repercussions.

Although illegal mining is male dominated, women also play a significant role either in supporting roles or as independent miners. Women typically engage in tasks such as hauling, processing materials, or trading goods and services within the mining camps. In some cases, women directly participate in the extraction of gold, particularly in smaller scale operations. Female miners are often driven by similar motivations as men's economic necessity. And the lack of alternative employment opportunities. However, their participation is often less visible and less documented, leading to an underestimation of the role they play in the illegal mining economy (Mensah and Bukari, 2024).

Also, in agreement with Antwi-Boateng and Akudugu (2020), a significant portion of the miners in *galamsey* operations are local residents, many of whom are former. Farmers faced with the declining profitability of agriculture, particularly cocoa farming, due to environmental degradation, competition and market volatility, these individuals turn to mining as a more lucrative alternative.

Though at the expense of long-term environmental sustainability, illegal mining provides an instant source of money for these local communities and the devastation of the same farms they had counted on. This change from farming to mining sets off a cycle of environmental damage that finally influences both sectors. Apart from local involvement, *galamsey* activities draw migrant workers, including foreign nationals like Chinese miners. One major and divisive feature of illegal mining in Ghana is the presence of Chinese miners. Sometimes the backbone of bigger *galamsey* operations is migrant labour, particularly those with more extensive knowledge of mining processes or access to advanced equipment. Their participation has added layer of complexity to the problem when they bring in big machinery, accelerating the rate of extraction but also aggravating. The environmental impact many times forming alliances with nearby miners. These migrants increased the scope and intensity of mining operations. Moreover, *galamsey* activities vary in scope, teams usually include a 5

to 20 people. The productivity of the location and the possible gold yield determine the crew size. Smaller operations could involve just a few people working informally, usually with basic instruments like pans, pickaxes, and shovels for more general operations (Antwi-Boateng Akudugu, 2020).

Particularly those involving migrant workers or more organized groups may involve more workers and more advanced machinery, such as excavators and dredging equipment. The team structure is generally informal, with miners working together based on personal relationships, community ties, or mutual financial interests. The duration of a team stay at a particular site can vary significantly. Some teams may work at a location for only a few weeks if the gold yield is low or if they face challenges such as confrontation with landowners or law enforcement. However, in cases where a site proves to be highly productive. Teams may remain for several months, extracting as much gold as possible before moving on. The transient nature of these operations, coupled with the fact that miners often abandon sites after depletion, leaves behind significant environmental damage such as open pits, contaminated water bodies and deforested land. These abandoned sites are often unsuitable for agricultural or other productive use without significant rehabilitation efforts.

To avoid detection and minimize conflict with farmers and local authorities, illegal miners often operate in a clandestine manner. They tend to work on farms or other lands during the absence of the land. This pattern of operation helps them avoid direct confrontation, but it also creates tensions within the community when farmers return to find their lands damaged. The timing of operations is strategic. Many times, working late or early in the morning, miners use the cover of darkness to engage in their duties, free from disruption. Moreover, young people often prefer far off places for their hobbies, often far from towns or in isolated areas of farmland. These sites offer a level of safety from law enforcement. Authorities or local vigilante groups trying to stop illegal mining. The remoteness also makes it challenging for Environmental Protection authorities to track and minimize the harm these operations generate. Sometimes miners construct makeshift camps close to their mining operations, resulting in semi-permanent communities that worsen environmental damage like water pollution and deforestation (Antwi Boateng & Akudugu, 2020)

1.6. Problem statement

Growth of illegal mining operations has resulted in a major environmental damage in the municipality including soil deterioration, hazardous chemical contamination of water bodies like mercury, deforestation and air pollution. Often referred to as “*Galamsey*” in Ghana, illegal mining is the rampant unofficial mining activity employing rudimentary

methods to extract gold and other minerals from the land. Widespread *galamsey* activities create major environmental problems such as deforestation, water pollution, and soil erosion which has severely degraded the Obuasi district. Large amounts of topsoil, which is necessary for farming, are removed during the extraction operations. Reduced soil fertility produced by this deterioration makes it challenging for cocoa trees to flourish in these areas (Andrews, 2015).

Further aggravating the issue is the disturbance of soil structure and the inclusion of heavy metals and harmful chemicals, which renders the ground unfit for agricultural use. Illegal mining activities involving the use of dangerous chemicals like mercury and cyanide have contaminated the local water sources. Crucially for irrigation and drinking water, these toxins escape into rivers and streams. Human health, as well as the surroundings are seriously at risk from these contaminated rivers which are source of water for communities living around. Moreover, for best development, the cocoa plants need pure water to grow, contaminated water sources might slow their growth and lower yields also large-scale deforestation often follows from illegal mining operations when trees are removed to create mining sites. Deforestation of this kind disturbs the ecological balance and causes the loss of biodiversity. Shaded conditions offered by forest canopies enable cocoa growth which is lost because of tree clearance from forest areas. This loss of forest also produces climate change, which influences cocoa output even more since irregular weather patterns become more common (Duncan, 2020).

The machinery used in illegal mining operations, along with the burning of substances to extract gold, releases pollutants into the air. This air pollution can have detrimental effect on both human health and cocoa plants. Dust and chemical particles can settle on the leaves of cocoa trees, hindering photosynthesis and reducing the overall health of the plants (Hilson, 2002b).

Another problem that arises is the interactions between miners and cocoa farmers in Obuasi district. The competition for land between illegal miners and cocoa farmers often leads to conflicts. Cocoa farmers rely on their land for their livelihoods, while illegal miners seek to exploit the land for quick financial gains. This conflict is exacerbated by the lack of clear land ownership and enforcement of property rights, leading to tensions and sometimes violent confrontations between the two groups (Teschner, 2012).

Moreover, the lucrative nature of illegal mining can create economic pressures on many sectors of the economy especially cocoa farming in the Obuasi district, tempting some to abandon their farms and engage in mining activities because the act goes on around their

boundaries. The promise of immediate financial returns from gold mining contrasts with the long term, more stable income from cocoa farming. This shift not only affect the sustainability of cocoa farming but also contributes to the cycle of environmental degradation (Hilson & Garforth, 2012).

Furthermore, the influx of miners in cocoa farming communities can alter social dynamics. Many times, miners bring unusual lifestyles and customs that could conflict with conventional farming communities. Common problems in places impacted by illegal mining areas include rising crime rates, changes in social conventions and disintegration of community cohesion. The social disturbance hinders attempts to solve the environmental and financial consequences of illegal mining (Adonteng-kissi & Asamoah, 2016). There are times also, when miners and cocoa farmers cooperate to lessen the detrimental effects of mining despite the tension. Local NGO's and community-led projects have sought to support alternative livelihoods and environmentally friendly living. Reforestation initiatives, mining educational effects policy reforms to safeguard the environment and farmers financial interests are all part of these endeavours. Open pits of artisanal miners are one of the major environmental issues confronting Ghana's cocoa growing Obuasi Municipal district (Owusu Nimo et al., 2018). These issues are causing harm to the land, water, and wildlife, and they are making life harder for the people who depend on cocoa farming for their livelihoods. These problems don't just hurt the local environment they also add to bigger global issues like climate change. Actions towards preventing and mitigating against environmental degradation are needed to protect soil health and the livelihoods of cocoa farmers. Identifying the effects of degradation is a first step in the process of redressing the damage already done to the environment (Osman et al., 2022).

As serious as these threats may be, I would like to investigate whether there are other additional economic and socio-cultural factors that influence the functioning of the Obuasi Municipal District in the Ashanti region of Ghana.



Figure 4: *Deep forest*

Figure 5: *degraded forest*

Figure 6: *clean waterfall*

Figure7: *polluted waterfall*



Figure 8: *Illegal mining in the inside cocoa farm*

1.7. Research Objective.

The objective of my study is to explore the effects of illegal artisanal mining commonly known as “*galamsey*” on cocoa farming in the Obuasi Municipality of Ghana, also to examine the interactions between miners and cocoa farmers in this context. This research aims to provide a comprehensive understanding of the extent and nature of these effects, the underlying factors driving these interactions, and their socio economic and environmental implications for the local community.

1.7.1. Assessing the Effect of Artisanal Mining on Cocoa Farming

My study seeks to quantify and qualify the environmental impacts of illegal mining on cocoa farming. In accordance with Tyagi et al.,(2014) this includes understanding how illegal mining practices, such as “deforestation”, which is depleting of the reserved forest by illegally mining at nights, “soil degradation” which is the removal of the top soil which is essential for crop planting by digging deep open pits without covering them and turning the soil upside down, and “water contamination” which is washing clay water into the rivers that serves as source of drinking and domestic water for nearby towns and villages. These affect soil quality, farm sustainability and cocoa production Specifically, it examines the extent to which illegal mining activities lead to the loss of fertile land, reduced yields, and diminished soil fertility, as well as how the use of hazardous chemicals like mercury and cyanide, contaminates water bodies that are essential for cocoa farming. The objective is to gather and

generate information that reflects the real time impact on environmental health production levels and the overall economic viability of cocoa farming in areas affected by illegal mining activities. The next point reveals how miners and cocoa farmers coexist in both sectors (Tyagi, Garg and Paudel, 2014).

1.7.2. Examining Interactions between Miners and Cocoa Farmers

My study also aims to explore the dynamics of interaction between illegal miners and cocoa farmers in the Obuasi Municipality. It aims to know how these two groups live together, the nature of their disputes, and the cooperative or negotiating techniques they use to lessen them. Consistent with Adonteng-Kissi, et al., (2016) the dynamic interactions between these two groups (artisanal miners and cocoa farmers often compete for land and resources. Their coexistence involves navigating conflicts that arise from their differing economic activities: mining, which can degrade the environment, and cocoa farming, which depends on fertile soil and clean water. He stressed these conflicts can manifest as disputes over land use, environmental degradation and livelihood disruptions. However, both groups may also develop strategies for cooperation or negotiations, such as land sharing agreements, conflict mediation, or sustainable resource management practices, in order to mitigate tensions and achieve mutual benefits, they emphasized (Adonteng-Kissi, Adonteng-Kissi and Asamoah, 2016). The next paragraph investigates the social and economic factors that drive miners to encroach upon cocoa farmlands and the responses of cocoa farmers to such encroachments. This objective shed light on the local socio-economic relationships and power dynamics that take these interactions by identifying the patterns of land use conflicts negotiation processes and resolution strategies.

1.7.3. Understanding Socioeconomic Implications

Another critical objective of my research is to explore the socio-economic implications of illegal mining on cocoa farming communities. The study assesses how the destruction of cocoa farms affects the livelihoods of farmers, their income levels, and their social status within the community. As said by Donkor et al., the implications of illegal mining on cocoa farming communities are crucial in understanding how deeply intertwined mining are with local livelihoods. They assumed cocoa farming is the primary source of income for many families in Obuasi, and the destruction of cocoa farms due to illegal mining has far reaching consequences. They also have the view that when farmland is destroyed by illegal mining, farmers do not only lose their crops but also the long-term fertility of their land is

lost and it takes long years to rehabilitate (Donkor et al., 2024). It also evaluates the broader economic impacts on the local economy, such as employment trends, shifts in agricultural practices, and changes in community cohesion. The study looks at how cocoa farmers adapt to the challenges posed by illegal mining, including whether they diversify their sources of income, change their farming practices or abandoned their farms altogether. The next point will examine policies and implementation strategies needed to curb the *galamsey* menace.

1.7.4. Informing Policy and Sustainable Development

Finally, this study aims to provide evidence-based recommendations for policymakers, local authorities, and community leaders to address the challenges posed by the coexistence of illegal mining and cocoa farming. The research evaluates current policies and interventions aimed at mitigating the negative impacts of illegal mining on agriculture and proposed new strategies for sustainable development. Wireko-Gyebe et al., in their research outlined Policies like Ghana's Mineral and Mining Act (2006) and the Environmental Protection Agency (EPA) Act (1994) mandate sustainable mining practices and environmental assessments before any mining activity begins. They stressed the government has also implemented the Inter-Ministerial Committee on Illegal Mining (IMCIM) to curb illegal mining. Although despite these frameworks, enforcement gaps and persistence of illegal mining highlights the need for more robust strategies (Wireko-Gyebe, Asibey and Baah-Enumh, 2022). These recommendations focus on balancing economic growth with Environmental Conservation, protecting farmer's rights, promoting responsible mining practices, and fostering collaborative approaches to resource management.

1.8. Research Relevance and Justification

Cocoa is important for Ghana's economy, in reference to Dixon et al., it forms a big part of its export being the 3rd largest commodity export in the country. amounting to 1.08 billion dollars in 2022 accounting for 5.3% of total export which is the 3rd largest export commodity in Ghana according to OEC report (2022). Ghana exports to 34 other countries with the Netherlands (21% of exports), United States (14%) and France (8.7%) being the largest importers of Ghanaian cocoa respectively Moreover, numerous peasant farmers in the Obuasi district rely on cocoa farming for their jobs and income, therefore identifying the effect of illegal mining activities that harm the environment where cocoa grows is important to protect the environment, sustain livelihood and ensure food security so that cocoa

farming can be expanded and maintain returns and the country's GDP can also increase as part of contributors alongside other commodities (Dixon et al., 2001).

Moreover, environmental degradation in cocoa growing areas can cause significant problems for the local community. Land degradation severely impacts agricultural productivity, rural livelihood, and food security. For instance, soil erosion and loss of fertility can dramatically reduce crop yield, leading to economic hardship for farmers (Hossain et al., 2020). Additionally, deforestation and loss of biodiversity can disrupt local ecosystems making the land less viable for farming and potentially forcing families to relocate thus losing vital aspects of their cultural heritage (Dhakal and Kattel, 2019).

Furthermore, conflict can arise between farmers and small-scale or artisanal miners over land and essential resources such as water and forest products (Hilson, 2002). Therefore, addressing these issues is crucial to prevent community unrest and ensure sustainable development. Identifying the causes of environmental degradation in cocoa growing regions is essential for the government to implement effective measurement and regulations. This approach can help farmers adopt sustainable cocoa farming practices that protect the land ensuring their long-term competitiveness of Ghana's cocoa in the global markets (O'Sullivan, 2017). By understanding and mitigating the factors contributing to environmental degradation Ghana can promote a more resilient and prosperous cocoa industry.

1.9. Research Questions

The following research questions seek to understand the economic effects of artisanal mining on cocoa mining and its interactions. Exploring these questions will throw more light on the conflicts as well as ways for sustainable coexistence.

1. How does participation in *galamsey* influence the economic stability of farmers compared to their traditional income from cocoa farming?
 - This question aims to investigate their direct environmental consequences of mining, such as soil contamination, water pollution, and the subsequent effects on cocoa farming productivity.
2. What factors contribute to varying levels of interactions between farmers and miners in Obuasi district?
 - This question focuses on the social and economic interactions between the two groups, examining issues such as land disputes, economic dependences, and their effect on sustainable farming practices and community cohesion.

3. What mitigation strategies and policies have been implemented or could be proposed to balance mining activities with the preservation of cocoa farming in the Obuasi district, and how effective are these measures.
 - This question investigates current and potential future policies and strategies aimed at reducing the environmental impact of mining whilst promoting sustainable cocoa farming, assessing their effectiveness and exploring new solutions.
4. What are the possible frictions between artisanal miners and cocoa producers?

Chapter 2

Literature Review

2.1. Introduction

Artisanal and small-scale mining ASM in Ghana plays a key role in generating money and acquiring assets improving people's lifestyles. Nevertheless, artisanal, and small-scale mining ASM is associated with adverse effects on small-scale miners, farmers, farmlands, forests, and water resources (Hilson and Garforth, 2012).

This literature review examines the environmental effect of artisanal mining on cocoa farming and the interactions between cocoa farmers and artisanal miners in the Obuasi district, Ghana, it combines several research findings to emphasize existing knowledge, identify areas where information is lacking and propose future research possibilities,

2.2. Effect of Artisanal Mining on Cocoa Farming's Environment.

Artisanal mining in Obuasi which is an informal activity carried out using low technology or with minimal machinery in gold extraction results in an increase in the amounts of heavy metals in soil and surface water. These heavy metals including mercury, lead, arsenic, copper and cadmium often exceed the acceptable level set by regulations (Armah et al., 2010,). Artisanal and small-scale mining ASM is a significant contributor to the presence of high levels of heavy metals in many places such as the coca-growing districts of Ghana. The extraction procedures frequently employ mercury, lead, arsenic, copper, and cadmium. These hazardous heavy metals can cause severe environmental and health problems when they contaminate water bodies that are utilized for irrigation and other agricultural activities.

Clarifying, Armah et al., 2010 asserted that mercury is frequently employed in gold amalgamation procedures to extract gold, making it one of the main sources of heavy metal contamination in artisanal mining. Incorrect management and disposal of mercury results in its emission into the environment. Mercury is combined with gold-bearing substances in artisanal gold mining to create a mercury-gold amalgam. Subsequently, the Amalgam is subjected to heat to convert the mercury into vapor, resulting in the extraction of pure gold. Miners release mercury vapor into the air when they burn the amalgam. In addition, residual mercury can infiltrate streams via runoff or incorrect disposal of garbage, resulting in extensive contamination. Additionally, Ore processing which encompasses the activities of crushing and grinding ore, is a customary procedure in the extraction of gold. This process results

in the release of heavy metals into the surrounding environment. These processes emit small particles of toxic metals present in the ore into the atmosphere and bodies of water. The presence of this contamination poses a risk to the quality of water used for irrigation, which could have long term consequences for cocoa output and the well-being of farmers (Armah et al., 2010).

In line with Darko et al., the gold amalgamation process involves the use of mercury particles which are then heated to evaporate the mercury, leaving just the gold behind. This technique is often favored for its straightforwardness and affordability.

Miners frequently handle mercury without protective equipment and dispose of products contaminated with mercury in an incorrect manner resulting in extensive environmental contamination. Chronic exposure to mercury vapor and contaminated settings can lead to significant neurological problems, such as tremors, memory loss and cognitive deficits. Children, who are more vulnerable to neurotoxic effects, are especially at risk. The accumulation of mercury in the body can result in renal impairment, as the kidneys play a vital role in the filtration and elimination of mercury. Inhaling mercury fumes during the amalgamation process might lead to respiratory issues such as chronic bronchitis and other lung disorders.

They continued that, developmental disorders can occur in unborn children when pregnant women are exposed to mercury, leading to delays in development birth abnormalities, and various health problems. The utilization of mercury and mining activities has the potential to pollute water supplies, soil, and air, thus impacting the entire ecosystem. The contamination has the potential to propagate to cocoa plantations, affecting the water quality used for irrigation and resulting in the buildup of mercury and soil and cocoa plants. Soil degradation occurs when heavy metals from mining activities contaminate the soil, leading to a decline in its quality. This can result in reduced fertility of the soil and have a negative impact on the yield and quality of cocoa.

Moreover, Communities residing near mining sites face the potential danger of mercury exposure due to contamination of water, soil, and air, the extensive contamination might result in a public health emergency, characterized by a rise in occurrences of health issues associated with mercury. Mercury exposure can have financial repercussions like increased medical expenses and lower productivity, which would aggravate poverty and economic problems in the affected community (Darko et al., 2019).

2.3. Pollution of Water, Air, And Land

The use of chemicals in artisanal mining results in the pollution of land, air and water, therefore affecting the soil and water resources vital for the production of cocoa. Regarding Armah et al., (2016), the presence of heavy metals and soil and water can cause cocoa trees to wither, leaves to yellow and drop in yields, particularly in places that have been mined out. Mining operations produce waste materials such as tailings and waste rocks that have elevated levels of heavy metals. These metals can seep into the soil and water, posing a risk to the environment. Additional substances employed in mining operations, such as cyanide, can also contribute to the presence of heavy metals in the environment. The presence of heavy metals and surface water bodies presents substantial hazards, including the introduction of heavy metals into the soil and plants when contaminated water is utilized for irrigating cocoa state. This can result in the buildup of hazardous metals and cocoa beans, which can have an impact on their overall quality and safety (Armah et al., 2010).

Furthermore, Armah et al., (2016), associate cocoa farming communities who depend on surface water for drinking face health hazards such as neurological and developmental abnormalities, malignancies, and organ damage.

Moreover, aquatic ecosystems are significantly impacted, elevated levels of heavy metals can have a catastrophic impact on aquatic organisms, resulting in a decrease in biodiversity and changes to the functioning of ecosystems.

All of these factors have significant and lasting environmental impacts on the production of cocoa soil degradation such as the accumulation of heavy metals in the soil can alter nutrient availability and soil structure as stated by Armah et al., this has an impact on the development and output of cocoa plants resulting in reduced production. Also, they claim that toxic metals can induce physiological distress in cocoa plants, leading to symptoms such as leaf chlorosis yellowing inhibited growth and diminished fruit quality. in addition, he holds the belief that the accumulation of heavy metals and cocoa beans is a hazard to food safety. This could result in contaminated cocoa being rejected in international markets, causing financial losses for farmers (Armah et al., 2016).

2.4. Deforestation, and livelihood destruction

In another case, Arthur et al., (2016) exposed that artisanal mining activities going on in the Talensi-Nandom areas of northern Ghana have depleted natural resources and disrupted rural lives. This more general ecological and social influence emphasizes the need of addressing the effects of artisanal mining on community well-being and environmental

sustainability. Common in the northern Ghanaian Talensi-Nandom districts, artisanal (ASM) is essential for the income generation for many rural areas. ASM offers financial benefits, but it also seriously affects the ecology and the way local people live (Arthur et al., 2016).

2.5. Impairment means of existence

Primary of means of subsistence for many of the rural people living in these areas is agriculture, which is their main source of food. Deforestation and soil degradation brought on by artisanal mining reduces the availability of arable land and hence affects agricultural output. Deforestation refers to the deliberate or accidental removal of trees from a forested area resulting in the loss of forest cover. Deforestation is widespread in artisanal mining as it necessitates the removal of vast forested regions to reach mineral resources. The process of deforestation leads to the depletion of extensive areas of forested land which plays a critical role in preserving biodiversity and offering essential ecosystem services. Ecosystem disruption forests are essential for climate regulation, soil and water conservation, and the sustaining of diverse plant and animal life. Deforestation affects these ecological activities, resulting in soil erosion, habitat loss for species, and changes in the surrounding temperature (Arthur et al., 2016).

Deforestation negatively impacts soil structure and nutrient cycling resulting in decreased fertility and reduced suitability for agriculture. Biodiversity loss, which is the destruction of forest habitats results in the extinction of plant and animal species including those that are unique to a particular area or have a restricted range. The decline in biodiversity negatively impacts the ecological well-being of the area and decreases the accessibility of natural resources that are essential for the sustenance of local communities. Moreover, illegal mining destroys land by the removal of the topsoil, leaving large, uncovered pits which breeds mosquitoes, introduction of harmful chemicals that deplete soil nutrients essential for cocoa growth and the production of dust which pollutes the air (Arthur et al., 2016).

Moreover, on the word of (Kazapoe et al., 2023), mining also affects water resources, the practice of artisanal mining frequently results in the pollution of water sources with toxic heavy metals and other harmful substances. This pollution has a detrimental impact on the quality of water that is used for irrigation, livestock, and home purposes, hence exacerbating the decline in agricultural production and public health.

Forests offer a diverse range of non-timber resources, including fruits, nuts, medicinal plants, and fuel wood, that are crucial for the sustenance and welfare of rural communities. Deforestation diminishes the accessibility of these resources, hence affecting food security, health, and income creation (Pandey, Tripathi and Kumar, 2016).

The intrusion of mining operations into agricultural and forest regions might result in the forced relocation of indigenous tribes, causing social upheaval. This displacement causes a disturbance in social structures and cultural legacy, resulting in conflicts related to land and resources. The arrival of miners and the resulting modifications and land utilization can significantly impact the social structure of communities, leading to social conflicts and weakening community solidarity.

2.6. Wider ecological and social consequences

Macháček, 2019, assert that, environmental degradation occurs as a result of the combined effects of deforestation, soil erosion, and water pollution caused by artisanal mining activities. This leads to a significant decline in the overall quality and health of the environment. This degradation not only impacts local ecosystems but also has wider ramifications for regional environmental well-being and long-term liability.

The researcher continues to stress that, the depletion of natural resources and agricultural land tightens the economic susceptibility of rural communities. Diminished agricultural production and depletion of non-timber forest products threatened the economic stability of households, rendering them increasingly dependent on mining which in turn worsens environmental degradation. The deterioration of the environment and the pollution caused by artisanal mining have substantial health consequences for the nearby communities. Exposure to pollutants and contaminated water sources can result in many health concerns, such as respiratory disorders, skin ailments, and chronic conditions that last for a long time (Macháček, 2019).

2.7. Regulatory framework

Regulatory frameworks refer to the set of rules and regulations established by governing bodies to govern and control various industries and sectors. Enforcement, on the other hand, pertains to the implementation and monitoring of these regulations to ensure compliance. Enhancing regulatory frameworks to ensure the implementation of responsible mining operations and mitigate environmental damage. implementing and upholding current legislation and regulations to deter unauthorized mining activity and encourage environmentally responsible mining practices. According to (Wireko-Gyebi, Asibey and Baah-Ennumh (2022), In Ghana, artisanal mining is governed by several regulations designed to manage the sectors environmental impacts and ensure sustainable practices. The key

legislation is the Minerals and Mining Act 2006 (Act 703), which sets out the legal framework for mining activities.

This law requires that before starting any mining activities, artisanal miners get licenses from the Minerals Commission. The licensing process serves to control mining operations so that they are conducted in an environmentally friendly way and do not disturb agricultural areas, including cocoa crops. The main regulating authority which oversees handling mineral resources and license issuing is the Minerals Commission. This guarantees that miners follow accepted procedures meant to minimize the environmental damage their operations generate. Under this legislative framework, artisanal miners are also obliged to do appropriate land reclamation following mining in line with environmental management techniques. Furthermore, as said by Wireko-Gyebe, Asbey and Baah-Ennumh, the Environmental Protection Agency EPA Act 1994 (Act 490), enhanced by the Environmental Assessment Regulations 1999 (LI 1652) is rather important in managing mining activity. These regulations mandate an Environmental Impact Assessment (EIA) for all mining operations, including artisanal mining. Finding possible environmental hazards and developing plans of action to minimize those hazards before mining starts depend on this approach. The EPA keeps an eye on adherence to these rules and has power to stop mining activities causing major environmental damage or levy fines. At the municipal level, the Obuasi Municipal Assembly has passed bylaws endorsing national rules tackling certain environmental and land use issues. These ordinances especially target controlling the effects of artisanal mining on agriculture, including on cocoa farming. The restrictions on land use, policies inside the district support national rules by customizing enforcement strategies to the particular environmental issues presented by artisanal mining in Obuasi. Moreover, they claim that the Law on Small Scale Gold Mining Activities 1989 (PNC L 218) offers extra rules after mining operations have stopped. This legislation underlines the requirement of miners participating in land reclamation and implementing sustainable environmental management policies.

The law also includes provisions for ensuring the safety and health of miners, which indirectly supports efforts to mitigate environmental degradation by promoting more controlled and safer mining practices. While these regulatory frameworks exist, their implementation faces significant challenges.

A major issue the researchers pointed out is the widespread informality within the artisanal mining sector, where many miners operate without proper licenses, making enforcement difficult. This has resulted in environmental degradation, including soil erosion and water contamination, which directly affects cocoa farming and other agricultural activities in Obuasi, although the government is working to strengthen these regulations, improve

enforcement and foster better collaboration between agencies. There are still gaps in compliance and monitoring. Thus, while the legal frameworks are comprehensive, their effectiveness largely depends on improved enforcement and the formalization of artisanal mining activities (Wireko-Gyebi, Asibey and Baah-Ennumh, 2022).

Essah and Andrew, revealed that, Measures include enforcing environmental regulations, providing remediation programs, promoting sustainable mining practices, and offering community financial and technical assistance. For example, in Ghana, the government has implemented measures like the *Galamsey* Taskforce, which enforces laws against illegal mining activities. The Minerals Commission of Ghana promotes sustainable mining practices, while programs like alternative livelihood programs provide financial and technical support to local communities while encouraging them to adopt non mining income generation activities such as agriculture. Furthermore, environmental remediation initiatives are in place to rehabilitate polluted water bodies and restore degraded lands caused by artisanal mining. These efforts aim to strike a balance between benefiting from revenues and protecting the environment for long-term sustainability (Essah and Andrews, 2016).

2.7.1. Knowledge Gaps and Future Research Directions

While existing literature provides valuable insights into the environmental effects of artisanal mining on cocoa farming and the interactions between miners and cocoa farmers, several knowledge gaps remain. Future research should focus on comprehensive environmental impact assessments, sustainable land use and management strategies, and the long-term ecological and socio-economic implications of artisanal mining. Additionally, interdisciplinary research integrating environmental science, public health, social sciences, and policy analysis is needed to address the complex challenges associated with artisanal mining and its effects on cocoa farming in the Obuasi District, Ghana (Shivji, 2017).

2.8. Conceptual Framework /Theoretical Analysis

Political ecology as a conceptual framework helps understand the intricate linkages between political, economic, and environmental factors driving the issues in question. Scholars including Boras and Franco (2018), Adu-Baffour et al., (2021), and Shivji (2017) offer analysis of how political and economic power dynamics affect environmental damage and land use disputes. Explaining further, political and economic power dynamics plays crucial

roles in defining land use conflicts and environmental degradation, particularly in areas that are rich with mineral resources. Boras and Franco (2018), looks at how unequal power distributions between state actors, corporations, and local communities create conditions where environmental and social interests often clash. They stress Government may prioritize economic gains over environmental protection, favouring mining companies or large-scale agricultural firms. This, they said can lead to land disposition, weak environmental regulations, and finally, land degradation, knowing those with political power capitalize on natural resources with minimal accountability. Similarly, Adu-baffour et al., (2021), aimed at the Ghanaian context, showing that artisanal miners and cocoa farmers often struggle to assert their rights against powerful political and economic actors. In this scenario, competition for land escalates as miners encroach on farming lands, resulting in environmental damage such as deforestation, soil degradation, and water pollution. These dynamics threaten and spark social conflicts among local communities. Shivji (2017) emphasizes this analysis to highlight how historical legacies of colonialism and continued economic inequalities foster patterns of land ownership that marginalize smallholder farmers. This marginalization leads to intensified conflicts, where communities resist the encroachment of miners and other powerful stakeholders who encroach on their farmlands and undermine their livelihoods. These insights emphasize how unequal power dynamics between local communities and powerful entities shape patterns of land use, enabling some actors to exploit resources in ways that exacerbate environmental and social tensions (Adu-Baffour et al., 2021).

According to Adonteng-Kissi (2016), customary and state land ownership combined in a complex mix defines the tenure system in this area, so generating questions regarding land rights and use. A good amount of the land is under customary ownership of local traditional authorities by the chiefs. Even so, government issued statutory land rights sometimes coincide with customary rights, which causes conflicts under customary law. For instance, a local family might claim a piece of land while a mining company with a government concession claims it under a different legal basis. The government's granting of concessions sometimes runs counter to the current agricultural use of lands, especially for cocoa growing. Legal concessionaries may intrude on agricultural fields without clear boundaries, generating conflict between themselves and the farmers.

Moreover, in their view, many of Obuasi's land territories lack official documentation and clear demarcation, which causes uncertainty about limits.

This is especially problematic in rural areas where land is usually handed orally or through informal agreement without adequate surveying or mapping. The absence of a comprehensive land registration system in Obuasi presently affects specific ownership situations

for many landholders without official titles or papers. Improving legal ownership or rights over a certain piece of property can be difficult. Absence of formal documents could lead to numerous claims on the same ground area. While mining companies might have opposed interest in accessing mineral resources, local communities, often represented by customary authorities, may have want in using. And for cultivation or habitation. Lack of unambiguous tenure rights aggravates these conflicts, and no mutually acknowledged authority, according to Adonteng-Kissi et al., (2016) causes issues. Furthermore, in conflict, our government given land rights and traditional Land Management, government policies may favour industrial or mining growth while local authorities give land primary priority for use or agriculture. This complicated land use even further by imposing conflicting requirements and jurisdictional uncertainty. Furthermore, to be observed is Obuasi's uncertain land tenure legacy stemming from past colonial land policies that often-ignored traditional land rights. Post-colonial land reforms have not been able to solve these issues, which drives ongoing disputes on inheritance and ownership of land. Sometimes customary inheritance practices split land among successors, generating smaller and more numerous landholdings with dubious boundaries (Adonteng-kissi & Asamoah, 2016).

As families argue over their portion of land, disagreements over inheritance might cause protracted court battles or even violence. Rising land values brought on by mining and development prospects have resulted in speculative land grabbing, that is, the acquisition of land without clear or legal claims, hoping to sell it later for more money.

Illegal mining often entails invasion of territory without appropriate permission or consent. *Galamsey* operators may occupy and damage land already in dispute or under legitimate ownership, so complicating the land tenure situation. Obuasi has poor enforcement of land tenure rules and regulations. Many conflicts remain unresolved or are resolved by unofficial or dishonest means. Because of the absence of a clear, coherent legal framework for handling land disputes, many of the local people lack the court system or legal tools to protect their land rights. Disparity usually makes them open targets for stronger organizations like mining corporations or speculators with easier access to legal counsel (Adonteng-Kissi and Asamoah 2016).

Boras and Franco (2018) argue that land tenure and property rights are central to understanding environmental degradation in Ghana, demonstrating that secure land tenure and property rights are crucial, as unclear ownership leads to exploitation, overuse, and mismanagement of land, driving environmental degradation in vulnerable areas. Unclear land

tenure systems exacerbate conflicts between cocoa farmers and artisanal miners, leading to unsustainable land use practices and addressing these tenure issues is crucial for sustainable development. Further highlight that land tenure and property rights are crucial factors in understanding environmental degradation, particularly in context where these rights are ambiguous or insecure in Ghana. Furthermore, confusing land ownership policies cause great conflicts between artisanal miners and cocoa growers. These disputes develop as both sides fight for the same land resources, usually resulting in unsustainable land use methods. For their livelihood, cocoa growers rely on the land, they therefore need stable, rich land for sustainability. On the other hand, artisanal miners often occupy these areas and damage the surroundings by means of soil erosion, deforestation, and mining activity contamination (Boras & Franco, 2018).

The lack of defined property rights in the district makes it challenging to implement rules and properly control land usage, therefore aggravating environmental damage. Promoting sustainable development depends on addressing these tenure problems since it would provide stability and transparency for miners and farmers, so allowing improved land. Management techniques and lessening of conflict. Clear land tenure rights would help to encourage long term planning and investment in land preservation, hence promoting environmental sustainability and economic stability in the area. (Boras, Franco & Wang, 2013).

Emphasizing the part government and policy play and resource management (Adu-baffour et al., 2021). Reducing the environmental effects of artisanal mining and supporting sustainable cocoa production depend on efficient governance systems, including involvement of stakeholders. Emphasizing that efficient management of natural resources depends on strong government and policy framework, especially in view of the intersection of agriculture and artisanal mining inside Ghana. If not sufficiently handled, the environmental effects of artisanal mining like deforestation, water pollution and soil deterioration can seriously jeopardize sustainable coping. Including all pertinent parties and decision-making procedures helps policies to be more precisely suited to meet the particular requirements and problems of every group. This inclusive method guarantees that the rules are not only equitable and all-encompassing but also enforced and approved by everyone impacted. Moreover, laws supporting sustainable development and offering unambiguous rules for land usage can help to balance the interests of artisanal miners and cocoa growers, therefore lowering tensions and encouraging harmony. Therefore, including stakeholder involvement into governance structures is essential to produce sustainable solutions that balance environmental Protection with economic development (Adu-baffour, Duam & Birner, 2021). By emphasizing how poverty and marginalization drive many communities to participate in

environmentally damaging activities like artisanal mining in areas like Ghana's cocoa growing regions. Shivji, (2017), emphasizes the socioeconomic causes of environmental problems and give underprivileged groups with little economic possibilities of vital source of income. Their unsustainable consumption of natural resources motivated by this economic need causes soil erosion, water pollution and deforestation. According to Shivji, measures aiming at poverty reduction and economic diversification are the means to solve these underlying causes of environmental damage.

By improving access to education, health care, and alternative livelihoods, such policies can reduce community's dependence on environmentally destructive practices. Moreover, economic diversification initiatives can offer sustainable income sources, alleviating pressure on natural resources and promoting Environmental Conservation. Hence, tackling the socioeconomic drivers of environmental degradation is essential for fostering sustainable development and ensuring the long term of both the environment and the communities that depend on it (Shivji, 2017).

Sprout and Sprout, (1957); Falk, (1971); Timberlake and Tinker, (1984) stated that broader geopolitical conceptualizations of security which focuses on the land, as the main factor of production, labour, and goods, and investigates economic resources location, points of supply and demand, economic management, main places of economic competency and economic exchange of goods and capital began by the late 1950s to incorporate in issues such as population growth, environmental degradation, and social inequality in poor countries (Sprout and Sprout, 1957). also criticizing the green revolution technologies, Andersson, Brogaard and Olsson, (2011), suggested that due to political ecology and its relation to food production under heavy industrial and capitalism, agricultural modernization could marginally increase environmental degradation and thereafter cause under production which is the main cause of hunger among those disadvantaged by this industrialized system such as road expansion, electrification by building of dams, as well as mining activities (Andersson, Brogaard and Olsson, 2011).

For Tyagi, Garg and Paudel, (2014) environmental degradation can be defined as the devaluing of the environment through depletion of natural resources such as air, water bodies, and soil caused by the removal of the topsoil. The destruction of ecosystems, habitat destruction, the extinction of wildlife and pollution.

However, The United Nations international strategy for disaster reduction defines environmental degradation as the reduction of the capacity of the environment to meet social and ecological objectives and needs, environmental degradation comes in many types

and form when natural habitats are destroyed, or natural resources are depleted (O'Brien et al., 2006). Environmental degradation is further defined as any change or disturbance to the environment perceived to be deleterious or undesirable. Environmental degradation is one of the ten Threats officially cautioned by the High-Level Panels on Threats Challenges and Change of the United Nations (O'Brien et al., 2006).

On the one hand, scholars analyzed how agricultural modernization could paradoxically increase marginalization, poverty, hunger, and environmental degradation rather than alleviating them.

In the context of environmental degradation, Titus refers to the decline or deterioration of the natural environment due to various human activities. This degradation can manifest in different forms such as deforestation, soil erosion, pollution, loss of biodiversity and habitat destruction.

Therefore, Titus et al., (2024), further define environmental degradation as the negative changes that occur in ecosystems and natural resources, in terms of environmental quality and ecosystem health. They emphasize how these changes impact the ability of ecosystems to provide essential services such as clean air, water, food and support biodiversity and human well-being, noting the term environmental degradation underlines the idea that human actions can cause harm to the environment compromising its ability to sustain life and human ecological balances (Titus et al., 2024).

2.9. Chapter Conclusion

This research investigates the specific effects of environmental degradation associated with illegal mining on cocoa farming within the Obuasi Municipal District in Ghana. Among the known impact caused by illegal mining in the cocoa farms there is evidence of soil degradation, water pollution, air pollution and their implications for the inhabitants of the district and the owners of cocoa farms.

3. Chapter 3

Methodology & Design

3.1. Introduction

Qualitative method was engaged to explore findings across different cocoa production in the municipality to identify commonalities and differences in environmental degradation and cocoa farming. Purposive sampling technique was employed to sample respondents who can provide in-depth knowledge about the topic being discussed, looking at the sensitivity nature of the topic.

My methodology was shaped by a commitment to ethical research practices, ensuring the safety and well-being of interview subjects while maintaining the integrity of the data collected.

Ethical issues took first priority in my research from the beginning of my research, especially in an area where illegal artisanal mining or *galamsey* causes major social and economic complexity. I made sure each participant gave informed permission before the interview started to guarantee that every participant completely understood their engagement. This approach included clearly stated explanations of the goal of the research. Participation was obviously fully voluntary, and players might draw at any moment without facing consequences. In a situation where problems related to unlawful mining could possibly endanger people, this was extremely crucial. One of the main foundations of my ethical approach was respect for confidentiality. Considering the social consequences of unlawful mining and its delicate character. I told every interviewee their identities would remain anonymous. Particularly in cases where conversations on perhaps incriminating or socially controversial issues like illegal mining operations or conflicts between miners and farmers touched on, personal details were deleted or changed to protect the individuals engaged in my research outputs, a top concern throughout the research process was keeping my interview participants secure. In occasions when I spoke with those engaged in illegal mining, I selected neutral and safe interview sites for every participant to minimize any possibility of reprisal or legal action. I took great care to do these interviews in private environments, therefore avoiding highlighting their involvement. My study sought to give a wide and fair picture of how artisanal mining affected social and environmental aspects of cocoa growing. In order to reach this, I carefully chose interviews depending on numerous factors to guarantee a varied and complete representation of voices from the society to record their experience and. Viewpoints on the effects of artisanal mining. I purposefully sought out participants in a spectrum of age groups.

This was essential as older farmers often have decades of experience with cocoa farming and have witnessed long term environmental changes, while younger farmers and miners may have more immediate experiences with the rapid rise of *galamsey*. Gender balance was also critical. While the mining sector is often male dominated, women also play significant roles, either directly in mining activities or as stakeholders affected by the shifting economic and environmental conditions. Interviewing women helped reveal these often-overlooked dynamics, especially regarding how family livelihoods and household roles have been altered by mining activities.

I was careful to include participants from various economic backgrounds. This included wealthier farmers with larger plots of land who might have more options when negotiating with miners, as well as smaller, more economically vulnerable farmers who may have fewer choices and be more susceptible to the allure of short-term financial gains from leasing their land to miners and even getting involved in it. Understanding how economic status influences the decisions to either cooperate or resist mining was critical to my analysis. Another key selection criterion I used was the participant's previous occupation, particularly in terms of whether they had previously been farmers before becoming miners.

In addition to interviewing miners and farmers, I also sought the perspectives of local community leaders and policymakers. These individuals provided insights into the broader structural and policy challenges related to illegal mining, land use, and Environmental Protection. Their perspectives helped contextualize the everyday experiences of miners and farmers within the larger regulatory and political frameworks governing the region.

By selecting interviewees based on these criteria, I aim to ensure that the data collected was as representative and inclusive as possible, reflecting the full spectrum of experiences and opinions within the Obuasi community. This approach allowed me to explore the complex and sometimes contradictory relationships between farming and illegal mining, providing a comprehensive understanding of the environmental, social and economic consequences of *galamsey* in the region.

The researcher engaged respondents through telephone conversation while a Research Assistant was recruited and trained using the ISS ethical guide although the research assistant is a professional enumerator. He was to purposely choose respondents and guide them to respond correctly to questions over mobile internet conversation with the researcher. Comprehensive interviews and conversations were employed to gain detailed insight and personal perspectives from five Cocoa Farmers, five Miners, a Local Community Leader, a Policymaker and a Cocoa Extension Officer. Semi structured interviews with open-ended questions to allow these participants to share their experiences and views on the environmental

impact of mining on cocoa farming, socioeconomic dynamics and existing mitigation strategies were conducted. This method helps in understanding individual and group perspectives deeply.

Due to the nature of respondents and demography of the area understudy, the research assistant was provided with an adequate internet bundle to enhance smooth communication and incentives such as gift packs were given to respondents to boost their confidence to be engaged in the research. One thing that boosted their confidence was the fact that they are having a foreign call, and they are talking to someone abroad and can speak their local language. The research assistant also provided pictorial evidence of the situation in the field.

Table 3: Socio-demographic characteristics of respondents

Participants/Tittle/unique Identifier	Gender	Age	Experience
Miner 1	Male	33	10 years in artisanal mining
Miner 2	Male	51	2 years in artisanal mining former cocoa farmer
Miner 3	Male	26	7 years in artisanal mining
Miner 4	Female	30	4 years in artisanal mining former cocoa farmer
Miner 5	Male	27	6 years in artisanal mining
Farmer 1	Female	45	12 years in cocoa farming
Farmer 2	Male	56	25 years in cocoa farming
Farmer 3	Female	61	40 years in cocoa farming
Farmer 4	Male	44	20 years in cocoa farming
Farmer 5	Male	39	10 years in cocoa farming
Policy Maker/ municipal executive	Male	48	5 years as Municipal officer
Community leader/chief	Male	67	30 years as chief of community
Cocoa Extension officer	Male	36	8 years as cocoa extension officer

Source: data from field work

Some sample questions asked were:

- How has mining activity affected your cocoa farming practices?
- Can you describe any changes in soil quality or water resources you've observed over the years?
- How do you perceive the relationship between miners and farmers in this community?

Also to explore the collective views and community-level interactions between miners and cocoa farmers, focus group discussions were used.

3.2. Data Analysis

Thematic analysis to analyze the qualitative data gathered from the interviews, and observations by identifying recurring themes, patterns and categories. The data was manually coded by using numbers to represent respondents to help organize it into meaningful clusters that address the research questions. Also, narrative analysis to understand the stories and personal account of participants to understand their broader social economic context and individual experiences related to mining and cocoa farming would be explored.

These qualitative methods provide a comprehensive understanding of the environmental effect of mining on cocoa farming, as well as the complex socioeconomic interactions between miners and cocoa farmers in the Obuasi municipal district.

3.3. Research Philosophy

In conducting research on the environmental effects of artisanal mining on cocoa farming and the interaction between them in the Obuasi Municipal District, my approach is guided by pragmatism and critical realism, two complementary philosophical frameworks that offer both practical and theoretical perspectives.

According to Mukumbang, (2021), Pragmatism is inherently focused on practical consequences, emphasizing the usefulness of knowledge and solving real world problems. In my research, I used pragmatism to address the complex interactions between environmental factors and socio-economic dynamics and Cocoa production in Obuasi. He further stated, this perspective Encourages flexibility in research design, promoting an approach that incorporates qualitative data analysis. By acknowledging that method can fully capture the nuances of environmental degradation in Cocoa farming, pragmatism allows me to adapt the research to the realities of the local context. Through field interviews with farmers, government officials, and miners, I aim to bridge theoretical knowledge with practical challenges. For instance, understanding how environmental degradation directly affects soil quality and cocoa yields was paired with.

Exploring how miners and farmers navigate land tenure disputes, pragmatism enabled me to stay responsive to new findings and adjust my research questions as necessary, ensuring that the study remains relevant and solution oriented. Critical realism complements pragmatism by focusing on the underlying structures and mechanisms that drive observed phenomena. In my research, I recognized that environmental degradation in the Obuasi district is not just a

surface level issue of soil erosion or water pollution. Rather, it is deeply embedded in social, political and economic systems, including land tenure, government policies, and global commodity markets. By employing critical realism, I aim to uncover the causal mechanisms that lead to environmental degradation. This involves looking beyond immediate symptoms, such as reduced cocoa yields to examine root causes like artisanal mining practices, weak land tenure rights and political neglect of environmental regulations. Critical realism allows for a multi layered analysis where I can explore both the observable effects of mining, for example, deforestation, and the deeper institutional factors that perpetuate such practices, for example the lack of enforcement of environmental laws.

Together, pragmatism and critical realism offers a holistic approach to my research. While pragmatism guides the selection of practical methods to collect and analyze data, critical realism ensures that I focus on the deeper causal explanations behind environmental degradation.

3.4. Conclusion

This combination allows me to not only describe the problem, but also provide actionable insights that can influence policy and practice in the region. For example, while pragmatism drives me to investigate which specific farming practices are most resilient to environmental degradation, critical realism pushes me to understand how. Power relations between artisanal miners, farmers and local authorities influence land use. In doing so, my research will not only contribute to academic knowledge but also provide practical recommendations to improve Land Management and Environmental Conservation in Obuasi. This approach will ensure that my research paper is both theoretically grounded and practically relevant, offering solutions that address both immediate environmental issues and long-standing institutional challenges (Mukumbang, 2021).

4. Findings and Discussions

4.1. Objective one:

To assess the specific environmental impact of artisanal mining on soil quality and water resources in cocoa farming areas.

Through field studies and data gathered, it was found that artisanal mining contributes significantly to soil degradation in cocoa farming areas. As a farmer stated during an interview, *“neighboring artisanal mining activities have significantly affected our cocoa cultivation operations. The most immediate impact has been on the soil quality, which has become degraded due to contamination from chemicals used in mining, such as mercury and cyanide. This contamination has reduced soil fertility, leading to lower crop yields”* (farmer 4). This is in line with what Darko et al., (2019), stated that the removal of topsoil during mining activities leads to the loss of soil nutrients that are essential for cocoa production. The introduction of chemicals such as mercury and cyanide further deteriorate soil fertility. Making it difficult for cocoa plants to thrive. An interview with the Cocoa Extension Officer also revealed that artisanal mining activities often lead to soil erosion and removal of fertile topsoil, which is crucial for cocoa cultivation. *“I conducted soil tests to check for changes in soil composition, nutrients levels, and pH balance the results prove that mining disturbs the land, strip away the nutrient-rich topsoil, making it less suitable for cocoa trees, which rely on well-good fertile soils for growth”* (cocoa ext. officer). Moreover, in an interview with the community leader, he affirmed the situation and said *“Indeed, galamsey has really affected my community and its members in a lot of ways, first and foremost, it has an effect on my land. A lot of land degradation is taking place because the galamseymen, so to speak will, normally have to destroy some trees, which of them are economic trees, clear the area and then start their excavation processes before they get to the hard rock and so you see that there's a large stretch of land is being excavated. The down soil is brought out and left to hang and so unless we reclaim those excavated large stretches of land, it is difficult. We are losing our farmlands”* (farmer 1).



Figure 9: *Excavation at artisanal mining site*



Figure 10: *Degraded land in a village*

Mining operations have also led to contamination of water bodies in cocoa growing regions. Rivers and streams near cocoa farms are polluted by runoff containing mining residues, including heavy metals, which degrade water quality and affect both the health of the cocoa plants and the local population since they rely on these rivers for domestic water supply.

The degradation of soil quality and water pollution directly reduces cocoa yield. Poor soil structure and nutrient loss hinder plant growth, while polluted water used for irrigation and spraying the cocoa introduces harmful substances into the crops. The reduced fertility of the land forces some farmers to abandon previously fertile land, leading to reduced agricultural output. The field work findings reveal that illegal mining has had profound adverse effects on cocoa farming in the Obuasi municipality.

Most of the cocoa farmers that were interviewed agreed and said that illegal mining was directly responsible for a notable drop in cocoa yield and production. About 3/4 of respondents affirm that their farms had suffered from land degradation. Illegal miners had removed large amounts of cocoa farmland to reach gold mines. There is now much less cocoa tree count and arable land accessible for farming due to this deforestation. About 2/3 of cocoa growers also cited soil

degradation as a major concern, pointing out that illegal mining operations had caused topsoil loss vital for cocoa development. Suitable for agricultural use, the use of heavy machinery and uncontrolled mining activities has upset the soil structure and lowered its fertility. More than half of the respondents also pointed out as a major result of unlawful mining is water contamination. Poisonous substances often utilized include cyanide and mercury are leaked into nearby waterways and streams.

These water bodies are crucial for irrigation and their contamination has adversely affected the health of cocoa trees, resulting in stunted growth, leaf discoloration and reduced cocoa bean quality.

In the Long term, if the current mining activities continue unchecked, the long-term consequences could include a collapse of the cocoa farming industry in Obuasi, affecting both local economies and Ghana's larger agricultural exports. This would contribute to food insecurity and loss of livelihoods for cocoa farmers.

4.2. Objective Two

To explore the socio-economic impact of artisanal mining on cocoa farmers in the Obuasi district.

Many cocoa farmers report the loss of significant portions of their farming land to mining activities. The expansion of mining operations has displaced several farmers and reduced the availability of fertile land. In his response the community leader lamented, *“the other negative is that it has affected even our farming activities. Food production has gone to the low”* (community leader and policy maker). The socioeconomic implications of illegal mining on cocoa farming communities have been severe. Around two-thirds of farmers reported a decline in household income due to reduced cocoa yields and this reduction has resulted in economic hardship among them, with many families struggling to afford basic necessities such as food, education, and healthcare. The findings suggest that the destruction of cocoa farms has undermined the economic base of these communities, leading to an increase in poverty levels.

Furthermore, the enticement of quick profits from illegal mining has led to significant social changes within the community, also, there is the indication that artisanal mining has enticed farmers away from cocoa farming due to the short-term financial benefits of gold mining, and many young people, especially men, are abandoning farming to engage in illegal mining activities. According to White (2020) this shift exacerbates a generational gap in the labour force, as younger individuals are increasingly moving out of farming. This shift has created a labor

shortage in the cocoa farming sector, with older farmers left to manage the farms. The decline in interest in cocoa farming among the younger generation threatens the sustainability of the sector in the country reflecting on the generational gaps stated has broader implications for the future of cocoa farming, as fewer young people enter the field of farming, knowledge transfer from older to younger generations diminishes, and innovations in farming practices may be less effectively implemented. The aging workforce, combined with shortage in labour also means that farms will decline in productivity as older farmers will lack strength and capacity to maintain the level of out and care the farm requires (White, 2020).

However, this shift from agriculture to mining is unsustainable in the long run and increases socioeconomic vulnerability as the miners lack the security and stability that cocoa farming once provided.

While some farmers temporarily benefit from the higher income generated by mining, many eventually face challenges due to the volatile nature of artisanal mining income. *“Our life is now in danger, all our lands for crop cultivation have been taking away from us. We don’t have clean water for our domestic use and feed our family” (farmer 3).* Additionally, as more land is diverted to mining, fewer resources are available for cocoa production, further destabilizing the economic foundations of the municipality. The shift in economic activities from farming to mining has also resulted in social conflicts. Disputes over land use between miners and farmers have led to tensions within communities, and the lack of effective land management policies worsens these issues.

4.3. Objective three

To explore mitigation strategies for balancing mining and cocoa farming and the interactions between the two parties in the Obuasi Municipality.

The dynamics between cocoa farmers and illegal miners, particularly in regions like the Obuasi district of Ghana, reveal complex and often ambivalent relationships. That goes beyond simple narratives of conflict. Through detailed field work, it becomes evident that the interactions between these two groups, often seen as distinct, involve a series of nuanced negotiations, overlapping interests, and only occasional tensions. Many miners were previously farmers, and the economic considerations that drive them into mining are often shared by their farming counterparts. As stated by a miner and I quote *“I was once a farmer, but now I enjoy mining because the smallest amount of god I will get will give me a lot of money” (miner 2)* As such, the lines between these groups are not as clear cut as they may appear at first glance.

One of the most striking observations from field work is that outright conflict between miners and farmers is not always the dominant theme. Instead, there are often forms of collaboration or cooperation, particularly in cases where farmers, faced with declining cocoa yields, agreed to lease portions of their land to miners. In exchange for immediate financial gains, many farmers are willing to engage with miners under specific conditions. *I was approached by a some galamsey men who said my land has gold in it and I can get a lot of money if I sell it to them. I agreed because my cocoa is not yielding, and I don't get any substantial income from it, so I had to join them because I needed money, and my farm is very old with dead cocoa trees. (Miner 4).*

Their decision to collaborate often hinges on a rational cost benefit analysis, where the immediate economic advantages of leasing land to miners outweigh the long-term benefits of maintaining cocoa production in these cases. Farmers receive compensation that can significantly improve their standard of living in the short term. A miner said, *“Galamsey, has helped me, I sold my cocoa farmland and joined galamsey myself, and it has helped me to build a 2-bedroom house and taken my lastborn to secondary school, I didn't get this for the fast forty years of cocoa farming” (miner 2).*

Tensions do arise, but they often stem from specific conditions surrounding the agreements rather than an outright rejection of mining activities. Farmers generally expect miners to honor the terms of their agreements, particularly concerning timely payment and respect for the precise boundaries of the leased land. Conflict is most likely to occur when miners failed to meet these expectations, such as when they delay payments or encroach on neighboring farms that were not part of the original deal. The ripple effects of mining, such as water pollution or soil degradation, can also create tensions, especially for farmers who choose not to participate in *galamsey* but suffer from the negative externalities. Mining on adjacent land.

A critical question that emerges is why some farmers choose to collaborate with miners while others resist. One of the primary factors influencing this decision is the stage of the cocoa trees' life cycle. The cocoa trees have a productive lifespan of around 40 years, after which replanting becomes necessary. The replanting process takes about five years, during which farmers have little to no income from them. And for many farmers facing the situation, the short-term financial relief offered by leasing land to miners becomes an attractive option as they would otherwise struggle economically during the fallow. In contrast, farmers with healthy. Productive cocoa trees and stable income streams from their crops are less inclined to lease their land for mining. For these farmers, the steady annual income from cocoa farming far outweighs the one-off payment from a *galamsey* deal.

Furthermore, non-economic factors also influence farmers decisions to either participate in or reject *galamsey* activities. For some, there is a deep attachment to the land, rooted in the legacy of farming that passed down through generations. The land represents more than just an economic asset. It holds sentimental and cultural value, symbolizing familial ties and a sense of identity in rare cases. Farmers may also reject mining offers out of a sense of civic duty perceiving their role as stewards of the land and loyal citizens who are committed to sustainable agricultural practices and the preservation of their environment.

Thus, the relations between farmers and miners are best understood as a spectrum of interactions that range from cooperation and mutual benefit to occasional conflict and tension. Rather than viewing these groups as static or inherently opposed, it is crucial to acknowledge the fluidity of their relationships shaped by economic necessity. Personal values and broader socio environmental factors. Many farmers are not merely passive victims of mining activities, but are active participants in negotiations that, while offering short-term benefits, also carry long term consequences for the sustainability of their land and livelihoods. This complexity underscores the need for more. he wants to analysis of the socioeconomic and environmental impacts of *galamsey* in Ghana's cocoa growing regions with careful consideration of the varied motivations and experiences of those involved.

The study found complex and often conflict-ridden interactions between illegal miners and cocoa farmers. Approximately more than half of cocoa farmers who were interviewed reported that they had experienced direct conflict with illegal miners encroaching on their land. Though the nature of these conflicts varied from verbal confrontations to physical altercations, many farmers expressed frustration over the lack of legal recourse or protection, when their lands were invaded by artisanal miners. *“We don’t fight with farmers they are our family and friends. We always get their consent before taking their land and we pay for it. Conflicts sometimes happen when neighboring farmers become jealous of the one who sold the land to us. And blames them for selling it. Other times too they confront us because they worry that our operations will affect their farms, especially those who’s farms are located in the lowland areas.” (Miner 1).*

Furthermore, the lack of effective enforcement of land tenure laws has worsened these tensions, with some farmers resorting to self-help measures such as forming community vigilance groups to protect their farms. However, there were also instances of negotiation and informal agreements between farmers and miners. About one third of cocoa farmers acknowledged that they had negotiated access or compensation agreements with the legal miners. These agreements often involved financial compensation or a share of the mining profits in exchange for temporary pieces of farmland. Arthur et al., is in agreement that this arrangement, while

providing some economic relief, was generally viewed as unsustainable by the farmers due to the long-term damage caused to the land (Arthur et al., 2016).

Despite the existence of Environmental Protection laws, enforcement has always been weak. Many artisanal miners operate illegally in the district, and environmental regulations are not effectively applied.

However, some local farmers and community leaders are collaborating with NGOs to rehabilitate degraded land through reforestation efforts and sustainable farming techniques. These efforts, while beneficial, are limited in scale and require more substantial government intervention to be effective on a wider scale. Also, stronger regulatory frameworks and enforcement mechanisms are essential to mitigate the negative impact of mining on cocoa farming. The government needs to enforce environmental laws more strictly, particularly in areas affected by illegal mining. Additionally, land tenure issues need to be addressed to prevent encroachment on farming lands.

Additionally, promoting sustainable agricultural practices alongside responsible mining activities is vital because farmers need support in adopting soil restoration techniques and agro-forestry systems to rebuild their lands. Furthermore, miners should be encouraged to adopt environmentally friendly practices to reduce their impact on cocoa farms.

4.4. Objective four

To evaluate the role of stakeholders in addressing the environmental policy challenges in the Obuasi cocoa farming region.

Fieldwork findings suggest that current policies and measures to address the impact of illegal mining on cocoa farming have been largely ineffective. Despite various government interventions, illegal mining activities continue to thrive due to weak enforcement, corruption, and limited community engagement. *“The government is really trying hard to put an end to this galamsey. They have put measures in place like “Operation Vanguard”, where soldiers are sent to the illegal mining sites. But the problem is that, after the soldiers leave, the miners stop for about a week and then they go back, and it even gets worse when they return. It is a huge problem” (Policy Maker).*

On the other hand, Oppong and Oppong, (2009) reflects, the involvement of multiple stakeholders, including the government, NGO's, mining companies, and local communities, is uneven. While some NGOs are actively involved in environmental restoration efforts, the government's presence in managing the competing interests of mining and agriculture is often lacking. Interviews with community leaders reveal a *“consensus that collaboration between the mining and*

agricultural sectors could mitigate the environmental impact. However, there is little evidence of meaningful cooperation between miners and farmers to find common ground” (policy maker).

Based on these findings, several policy recommendations are proposed.

There is a need for stronger enforcement of existing mining regulations to prevent illegal mining activities. This could involve increasing the resources and capacity of local authorities to monitor. And enforce mining laws as well as establishing special task forces to tackle illegal mining operations. The government and local authorities should involve cocoa farmers and other community members in decision making, processes and policy implementation, education and awareness. Campaigns about the negative effects of illegal mining and the importance of sustainable cocoa farming practices could help foster a sense of shared responsibility and cooperation (policy maker).

To address the economic drivers of illegal mining Alternative livelihood programs should be developed for communities affected by illegal mining. These programs could include skills training, micro credit facilities, and support for sustainable agricultural practices to provide alternative sources of income.

Reforming the land tenure policy to ensure that farmers have secure and recognized rights to their lands would help reduce conflicts between farmers and miners. Legal reforms should simplify land ownership processes, protect all cocoa farmers right, and ensure fair compensation for land affected by mining activities

The findings furthermore suggest that *“international donors and development organizations could play a role in supporting sustainable development initiatives in Obuasi, such as providing funding for environmentally sustainable farming techniques and remediation projects” (community leader).*

During my field work, I witnessed firsthand the devastating effect of illegal mining or *galamsey*, on local communities and the environment. The sight of women and even children struggling to make ends meet, young people risking their lives in an unsafe mining condition cover with mud, dirty water, and the ravaged landscape left a lasting impression on me. The depletion of natural resources and destruction of the environment felt tragic and deeply unsettling, as though we were watching a movie where both livelihood and the land itself slip and drown away. It is clear to me that something urgent must be done to address this *galamsey* crisis affecting the country. I believe that if the government invests in creating sustainable employment opportunities, especially in farming and providing incentives to support environmentally friendly agricultural practices, it will help to curb the illegal mining crisis. Moreover, offering young people an alternative path to economic gain, one that does not risk their life, health and their communities would be essential for livelihood and humankind.

CHAPTER FIVE

5. Conclusions and recommendations

5.1. Introduction

Through my field research in the Obuasi District, I conducted a fine-grained analysis of the complex environmental effects of artisanal mining on cocoa farming and the interactions between miners and cocoa farmers. The environmental consequences are significant and multifaceted with deforestation, water pollution, and soil degradation. Being the most prominent outcomes, artisanal mining or *galamsey* involves the destruction of forests and the removal of topsoil, which severely depletes soil fertility and essential components for cocoa cultivation. Contaminants such as mercury and cyanide are often used in the extraction process to seep into nearby water bodies poisoning irrigation sources and further diminishing cocoa yields.

What became evident during my research was the complicated relationship between cocoa farmers and miners. While it is easy to assume that these two groups exist in constant conflict, the reality is far more nuanced. Farmers, especially those whose cocoa trees are aging or unproductive, often collaborate with miners for short term financial gain, leasing parts of their land in exchange for immediate compensation. For these farmers, the short-term income from mining can outweigh the long-term sustainability of cocoa farming. However, tensions arise when informal agreements are violated. For example, when miners encroach on land beyond agreed boundaries or fail to reclaim the land after use, leaving it barren and unsuitable for future farming.

Additionally, the ripple effects of mining activities are felt even by farmers who do not engage in such practices. Neighboring farms often suffer from water contamination or soil erosion due to mining operations next door, creating a sense of unfairness and frustration among those farmers. The overall impact is a fragmented agricultural landscape where some farmers benefit temporarily from artisanal mining while others endure long lasting environmental degradation that compromises their livelihoods.

5.2. RECOMMENDATIONS

5.2.1. Establishing clearer regulatory frameworks

Based on my findings, it is essential for authorities to implement clearer regulatory frameworks that govern artisanal mining activities, particularly on agricultural lands. Currently in the Obuasi

district, the legal oversight is insufficient, leaving farmers and miners to negotiate informal agreements that often lead to disputes. The government must create and enforce guidelines that ensure miners are held accountable for environmental restoration, such as replanting trees or rehabilitating soil after mining.

5.2.2. Improved monitoring of mining activities.

I strongly recommend enhancing the monitoring of artisanal mining activities, particularly with respect to environmental impacts. While regulations exist, enforcement is often weak or inconsistent. The use of modern technologies like drones or satellite imagery could provide more accurate and real-time surveillance of mining activities, allowing authorities to intervene when necessary. collaborate with local communities and its monitoring process could empower farmers to report illegal mining activities or environmental infractions directly to the authorities.

5.2.3. Developing community-based agreements.

Another crucial step is fostering community-based agreements that formalize the relationship between farmers and miners.

These agreements should guarantee that the interests of both parties are safeguarded. Farmers should get just remuneration for their land use, and miners should be compelled to pursue environmentally friendly methods that reduce damage. Establishing a legal framework for these agreements would help to lower the possibility of problems, particularly those involving boundary disputes or postponed payments. Crucially, these agreements should mandate that miners dedicate themselves to environmental rehabilitation, including tree planting and soil restoration. So, guaranteeing the Land's viability for next use in agriculture.

5.2.4. Promote sustainable mining and agricultural practices

Encouraging sustainable methods in both sectors would help to minimize the bad consequences of artisanal mining on cocoa farming.

Concerning miners, education in environmentally friendly mining methods is essential. The government and NGO's can play a key role by providing technical training and financial incentives for adopting practices that reduce soil and water contamination. For farmers, support during the replanting phase of cocoa cultivation, such as subsidies for seedlings and access to microcredit, can help reduce the temptation to lease land for mining during financially challenging.

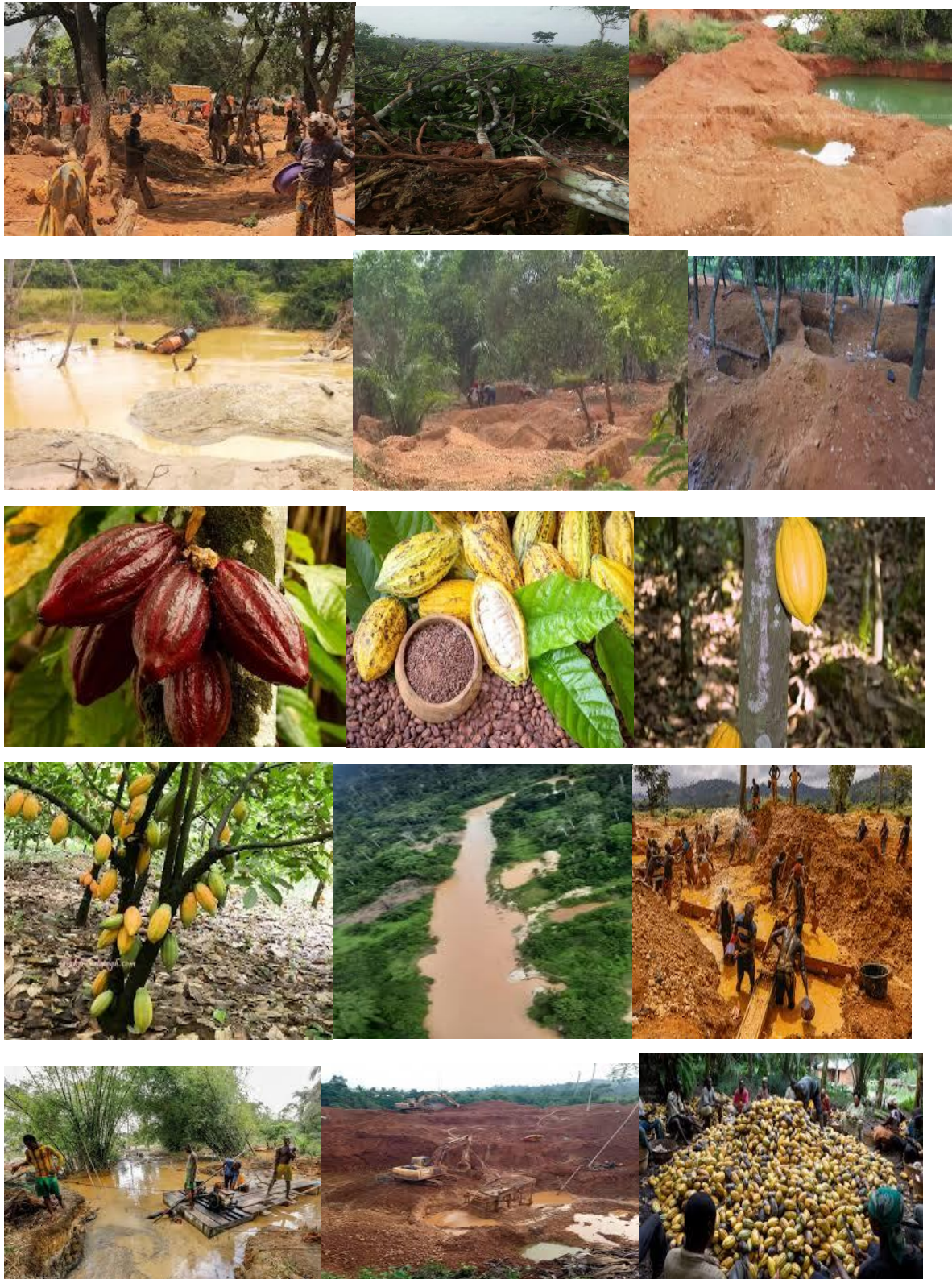
5.2.5. Economic diversification for cocoa farmers

Finally, my research indicates the need for economic diversification to reduce farmers' dependence on cocoa farming and discourage short term leases to miners. By introducing alternative livelihoods, such as, agroforestry, beekeeping, or aquaculture, Farmers can generate additional income streams, making them less reliant on unsustainable mining deals. This approach would also promote biodiversity and contribute to the long-term environmental sustainability of the region.

In conclusion, the relationship between artisanal mining and cocoa farming in the Obuasi district is defined by a delicate balance of shared and conflicting interests. While some farmers benefit in the short term from mining revenues, the long-term environmental costs are devastating, threatening both agricultural productivity and the overall sustainability of the community. Future research in addressing these issues requires a holistic approach. Combining stronger regulations, enhanced monitoring, Community collaboration and economic diversification to ensure that both mining and farming can coexist in a way that benefits all stakeholders.

Appendix

Images from field work



Source: pictures from field work

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