



Drawing the Linkages: Illegal Mining, Livelihoods, Agriculture and Food Security in Ghana

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1. Introduction



This research investigates the impact of illegal mining on livelihoods, agriculture, and food security in Ghana, driven by the increasing prevalence of unregulated mining activities that threaten sustainable development. While mining contributes to economic growth through job creation, foreign exchange earnings, and infrastructural development, illegal mining - commonly known as "galamsey" has led to severe environmental degradation, including deforestation, water pollution, and land destruction.

A core aspect of this report is an analysis of Ghana's legal and policy frameworks governing mining activities. Despite the existence of comprehensive legislation, such as the Minerals and Mining Act of 2006, (Act 703), challenges persist in enforcement, regulatory capacity, and institutional coordination. These shortcomings often allow illegal mining to operate unchecked, compounding environmental and social issues.

The report also examines the specific challenges posed by illegal mining to rural populations. It highlights how illegal mining disrupts traditional livelihoods by encroaching on farmlands, contaminating water sources, and leading to displacement. Such disruptions threaten food security by reducing land available for cultivation; degrade soil fertility, and increase food prices due to diminished agricultural productivity.

Lastly, the report explores the social and economic ramifications, including community displacements, conflicts, and other related factors that undermine local development efforts at combating illegal mining. It emphasises that combating illegal mining does not only requires stricter enforcement of existing laws; but, also

sustainable practices, community engagement, and policies that mitigate environmental harm while promoting economic resilience.

Ghana covers an area of 239,567 km² (92,497 sq mi), spanning diverse ecologies, from coastal savannas to tropical rainforests. According to 2024 estimates from World Bank data, Ghana, with an estimated population of approximately 35 million, ranks as the second most populous country in West Africa. The country has the potential to produce variety of minerals including limestone, silica sand, kaolin, stone and salt (Coakley, 2003). The main minerals produced by large-scale companies are gold, diamond, bauxite and manganese, while industrial minerals such as kaolin, limestone and silica sand are mainly produced by small-scale operators. Ghana is among the world's top producers of gold (Coakley, 2003). Ghana ranks seventh in the world for gold production (Amponsah, et al., 2023). Since the colonial era, gold has contributed to over 90 percent of Ghana's GDP, making the mining industry significant to the country's socioeconomic development (Amoatey, et al., 2017). Over 28,000 people are employed in the mining sector, which includes 300 small groups and 23 big companies (Amoatey, et al., 2017).

Ghana has the right institutions, rules, and laws set up to effectively regulate and monitor mining operations, promote development, while minimising environmental degradation (Asumda, 2022). However, the mining sector continues to encounter various regulatory challenges, including the inability to oversee multiple regulations, insufficient human and institutional capacity, and a lack of communication among regulatory agencies. The challenges also include difficulty in resolving several rules and disputes among agencies, low institutional and human capabilities, poor institutional cooperation and coordination, and political intervention in permit issuing (Asumda, 2022).

The mining industry in Ghana was shaped by the establishment of the Minerals Commission in 1986 and other legislative changes. The Minerals and Mining Act of 2006, (Act 703) which created a comprehensive legal framework governing mining operations, was a significant turning point (Anafo, et al., 2023). The President of Ghana is vested with all minerals by the legislative framework and regulatory policies, operating in the best interests of and on behalf of all Ghanaians. The minister responsible for lands and natural resources is thus empowered to negotiate, issue, cancel, suspend, or renew mineral rights under the mining law on behalf of the president, as per Section 5(1) of the Minerals and Mining Act, 2006, Act 703.

According to Ghana's Minerals and Mining Act, 2006 (Act 703), a small-scale gold mining operation is any successful and economical method of extracting gold that does not require significant financial outlays by a single person, a group of people no more than nine, or a cooperative society composed of ten or more people. The Small-scale mining is predominantly a poverty-driven activity, often undertaken in the poorest and most remote rural areas of a country by a largely itinerant, and

poorly educated people with few employment options (World Bank Group, cited in Aryee, 2003).

Illegal mining accounts for more than 25% of global gold production, and an estimated 20 million individuals mine illegally worldwide (Erusani & Aji, 2021). The rise of artisanal and small-scale mining (ASM) characterised by low technology, limited productivity, minimal capital investment, and a lack of formal regulation is increasingly prevalent in developing contexts such as Ghana, often driven by local participation (Baddianaah et al., 2022). Illegal mining presents both positive and negative implications for Ghana and other developing countries. On one hand, it contributes to employment creation and enhances household incomes; particularly, within rural communities. On the other hand, it poses significant challenges to livelihoods, food security, and sustainable development. These challenges include farmland degradation, soil erosion, and broader environmental deterioration resulting from unregulated mining activities. Illegal mining contribute to water pollution, soil degradation, river siltation, and plant loss (Padhiary & Kumar, 2024). Additionally, cases of exposure to toxic chemicals through ingestion and inhalation have been documented (Darkwa & Acquah, 2022). Given these dynamics, it is critical to examine the interlinkages and impacts of illegal mining on agriculture, food security, and broader socio-economic systems within the country.

2. Overview of Mining Policies and Laws in Ghana



Ghana's legislative framework and regulatory policies play an important role in the mining sector; particularly, in ensuring sustainable and responsible mining

practices and addressing socioeconomic issues concerning the environment. The sector is overseen by the Ministry of Lands and Natural Resources, which is responsible for formulating policies and ensuring sustainable development of the industry. The Minerals Commission serves as the main regulatory body, granting licenses and monitoring compliance with mining regulations. Despite the existence of various regulatory policies, challenges within the existing framework has led to inadequate compliance with mining laws, negatively affecting development and the environment.

An in-depth study of the current legislative framework reveals certain shortcomings that have greatly impacted and intensified illegal mining activities throughout the nation (Bansah, 2023; Kumah, 2022a; Heipon, 2016; Hilson and Potter, 2003). The complex and rigorous registration process has been identified as an issue in the regulatory framework (Adu-Baffour et al., 2021; Hilson, 2017; Aryee et al., 2003). This, to a large extent, explains why so many years after the legalisation of small-scale mining, an overwhelming majority of Ghana's ASM miners continue to operate illegally, that is, without licenses (Teschner, 2012; Banchirigah, 2008; Hilson and Potter, 2003). The law allows the provision of mining licenses only to Ghanaian citizens who are 18 years or over and registered by the district centre in the designated area (Section 83). But this procedure by which individuals have to obtain small-scale mining licenses has been described by most miners as tedious and expensive; hence, most small-scale miners operate illegally (Kumah, 2022a; Banchirigah, 2008).

1.1 Legislative and Policy Framework Governing Mining in Ghana

Ghana has long been recognised as one of Africa's leading gold producers. To manage this critical sector, a robust legal and policy architecture has evolved to regulate both large-scale and small-scale mining operations. The core objective of this framework is to facilitate mineral resource exploitation that is economically beneficial, environmentally sustainable, and socially responsible. The key legislations regulating mining in Ghana are as follows:

2.1.1 The 1992 Constitution

Article 257(1) of the 1992 Constitution Ghana provides that public lands and other public property are vested in the President on behalf of, and in trust for, the people of Ghana. This means the President is not the owner but a custodian, acting in the public interest. Natural resources, including minerals, are national assets and must be managed to benefit all Ghanaians. State agencies like the Minerals Commission, EPA, and Lands Commission are mandated to regulate their use. This constitutional provision underpins state authority over land allocation and resource management. It justifies government actions to curb illegal mining and ensure environmental sustainability. Illegal small-scale mining (galamsey) violates this principle by degrading land and harming communities. Such activities undermine the trust placed in the state to protect public property. Responsible mining must align with

national development and environmental protection goals. The Constitution reinforces the need for equitable and sustainable use of Ghana's resources.

Article 41(K) of the 1992 Constitution places a duty on every citizen to protect and safeguard the environment. This obligation reflects the shared responsibility of Ghanaians in preserving natural resources for current and future generations. Citizens are expected to avoid actions that cause environmental harm, including pollution, deforestation, and land degradation. In the context of mining, this means rejecting illegal practices that destroy forests, water bodies, and farmland. Environmental protection is not just a state duty, but a civic one, requiring active public participation. This principle empowers communities to hold individuals and companies accountable for environmental abuse. It reinforces the idea that sustainable development begins with responsible citizenship and collective action.

2.1.2 Small-Scale Gold Mining Law, 1989 (PNDC Law 218)

The Small-Scale Gold Mining Law, 1989 (PNDC Law 218) was promulgated to legitimise and regulate small-scale gold mining in Ghana. It provided a simplified licensing process for Ghanaian citizens to engage in artisanal mining, formally recognising the sector and offering legal protection for operators. The law required miners to register with the Minerals Commission and operate within designated areas. However, access to legal permits remains fraught with bureaucratic delays, lack of awareness, and limited institutional support, which has inadvertently incentivised illegal mining (Botchway & Nyame, 2023). These implementation challenges eventually led to the integration of the law into the more comprehensive Minerals and Mining Act, 2006 (Act 703).

2.1.3 The Minerals and Mining Act, 2006 (Act 703)

The primary legislation governing mining in Ghana is the Minerals and Mining Act, 2006 (Act 703), as amended by the Minerals and Mining (Amendment) Act, 2015 (Act 900) and the Minerals and Mining (Amendment) Act, 2019 (Act 995). It declares that the Republic of Ghana owns all minerals in their natural condition, and the President holds them in trust. A mineral right, which includes mining, prospecting, and reconnaissance licenses, must be applied for by anybody who wants to search for, explore, or extract minerals. The Minister of Lands and Natural Resources grants these rights in accordance with the Minerals Commission's recommendations. The Act mandates that mining companies demonstrate financial and technical capacity, employ and train Ghanaians, and compensate affected communities. Environmental and forestry permits are required before operations begin. Companies must pay royalties, rents, and fees, while the government holds a 10% free stake in large projects. It also allows for stability agreements, promotes transparency, protects the environment, and sets penalties for illegal mining, ensuring responsible use of Ghana's mineral resources.

2.1.4 The Minerals Commission Act, 1993 (Act 450)

The Minerals Commission is the regulatory authority established under Act 450 to oversee the efficient and transparent administration of mineral resources. Its roles include the evaluation of mining applications, policy advisory functions, and inspection of mining sites. However, the challenges in monitoring unlicensed mining operations, especially in remote areas, remain significant due to limited resources and institutional capacity (Hilson & Osei, 2022).

2.1.5 The Minerals Income Investment Fund Act, 2018 (Act 978)

As amended by the Minerals Income Investment Fund (Amendment) Act, 2020 (Act 1024), it is an Act to establish a Fund to manage the equity interests of the Republic in mining companies, to receive mineral royalties and other related income due the Republic from mining operations, and to provide for the management and investment of the assets of the Fund and for related matters.

2.1.6 Environmental Protection Authority (Act 1124)

In 2025, the EPA Act, 1994 (Act 490) was repealed and replaced by the Environmental Protection Act, 2025 (Act 1124). The Environmental Protection Agency (EPA) was established to regulate the environmental impacts of economic activities, including mining. However, enforcement gaps and political interference have hindered the EPA's ability to sanction defaulters; particularly, in the informal mining sector. Act 1124 aims to incorporate international conventions into domestic law and develop domestic rules for environmental protection and preservation. It restates and consolidates existing environmental laws, elevating the EPA to an authority to regulate, protect, coordinate, and exercise general oversight over climate change and the environment.

2.1.7 Minerals Development Fund (MDF)

The Minerals Development Fund was established under the Minerals Development Fund Act, 2016 (Act 912) to ensure equitable and sustainable development in mining communities. The fund is managed by a board and receives contributions from mining companies based on their mineral production. It is responsible for financing development projects, infrastructure, and social interventions in mining communities to enhance their socioeconomic well-being.

2.1.8 Environmental Protection (Mining In Forest Reserves) Regulations, 2022 (L.I 2462)

It provides a comprehensive legal framework aimed at regulating mining activities within forest reserves to ensure environmental sustainability and resource conservation. These regulations specify areas where mining activities are prohibited, such as globally significant biodiversity areas, cultural sites, and high conservation value zones, thereby protecting critical ecological and cultural assets from harmful mining practices. Sobeng et al. (2018) and Yoda (2024) highlight that the legalisation of L.I. 2462 reveals critical gaps in both policy and research. It

remains unclear how this policy shift affects biodiversity, carbon stocks, and emissions. While the economic contributions of gold mining are undeniable, its ecological costs have received limited attention. The government has presented the environmental Protection (Mining in Forest Reserves) Revocation Instrument, 2024 to parliament. The new LI Seeks to work LI 2462 in order to limit mining in the nations forest reserves.

2.1.9 Ghana Gold Board Act 2025 (Act 1140)

This Act oversees, monitor, and undertake the buying, selling, and export of gold and other precious minerals was passed into law by Parliament on Friday, 28 March, 2025. As part of efforts to revitalise the local economy, President John Dramani Mahama initiated the establishment of the Ghana Gold Board (GoldBod), which falls under the Ministry of Finance. The introduction of the Ghana Gold Board Act, 2025, aims to combat gold smuggling and illegal mining, strengthen state control over the mineral trade, and prevent the loss of national resources. The Act imposes stringent penalties for smuggling gold, increases the cost of illegal activities, and deters such behaviour. Additionally, the Gold Board has enhanced its enforcement efforts. The Ghana Gold Board is expected to play a pivotal role in formalising the small-scale gold mining sector, ensure better regulation, and provide support services for industry players.

2.2 Recent Reforms and Institutional Responses or Interventions

Recognising the deepening crisis posed by illegal mining, the Government of Ghana has introduced a series of interventions. These include the following:

- The Inter-Ministerial Committee on Illegal Mining (IMCIM) was formed to coordinate national efforts against illegal mining.
- In 2017, Ghana's Lands and Natural Resources Minister imposed a ban as part of efforts to end illegal mining and its negative impact on the environment.
- The Operation Vanguard and Operation Halt task forces were deployed with military support to dismantle illegal mining operations.
- Community Mining Schemes (CMS) was launched as a formalised alternative, allowing local miners to operate under regulated conditions with environmental safeguards.
- Technological tools such as drones and a digitised mining cadastre system were piloted to enhance transparency and monitoring.

While these initiatives reflect political will, they remain constrained by limited grassroots ownership, fluctuating political support, and weak follow-up mechanisms. According to Yeboah (2023), some of the reasons for the failure of government interventions aimed at combating illegal mining activities include inadequate legal and institutional structures, political interference, and a lack of political will. Again, Yeboah (2023) asserts that in order for state enforcement authorities to effectively monitor and oversee illegal mining operations, they require extra funding, technology, equipment, and human resources. Inadequate

planning, poor stakeholder management, and a lack of cooperation among the government, the Minerals Commission, and local chiefs all undermined the nation's efforts to stopping illegal mining.

3. Analysis of the Impact of Illegal Mining

3.1 Impact on Livelihoods



The global mining industry is a significant economic driver, generating \$711 billion in revenue from the top 40 companies in 2022 (Demeubayeva, 2023; Dou et al., 2023; Hodge et al., 2022). It significantly contributes to the gross domestic product (GDP), employment, and foreign exchange earnings of many countries worldwide (Ahadjie et al., 2021; Kabore et al., 2021). In Guinea, for instance, the Papua New Guinea Extractive Industries Transparency Initiative reported that the industries contributed 89% to exports, 29% to GDP, and 10.1% to corporate tax, salary and wage tax, dividends, and royalties in 2020 (Yamarak and Parton, 2021). In Ghana, Kenya, Tanzania and other parts of developing economies where mining operates, whether on a large or small scale has contributed to per capita income through job creation, resulting in improved livelihood status of people (Apollo et al., 2017; Mwakesi et al., 2020).

Artisanal small-scale mining and its related activities are often carried out in Ghana along with subsistence farming. Some recent studies (Maconachie and Hilson, 2018; Yankson and Gough, 2019) have revealed that, the two activities are becoming primary sources of livelihood for several rural residence in mineral rich communities of the country. Some evidences have revealed that in Ghana, ASM directly employs an estimated number of one million of economic vibrant population, and supports close to 4.5 million individuals in other sectors of the economy (McQuilken and Hilson, 2016). As a result, Ghana was ranked second to

Tanzania in terms of the number of people participating in ASM as an economic activity in Africa (Hilson, 2016).

The economic benefit of mining is tremendous. The mining industry generates billions of Ghanaian cedis (GHS) from exports and accounts for 6% of Ghana's GDP, making it a major source of foreign exchange earnings (Owusu et al., 2016; Owusu-Antwi et al., 2016). According to Söderholm & Svahn (2015), government budgets rely heavily on the money collected from taxes and royalties paid by mining firms. This money enables investments in social programmes and infrastructure that contribute to economic growth. Along with tax income, jobs created by the mining industry contribute to lower poverty rates and higher living conditions in the areas where mining operations are conducted. However, mining communities are among the poorest in the nation, despite the anticipated advantages of gold mining (Appiah & Buaben, 2012).

3.2 Impact on Agriculture



Ghana's agriculture industry is considered to be the most important economic sector, employing over 29.75% of the workforce (Asravor & Sackey, 2023) and contributing roughly 18.27% of the nation's GDP (Statista, in 2024). Mining and agriculture have a lot in common (Cuba et al., 2014). Competition for resources such as land usually results in conflict (Aragon & Rud, 2012). Mining often has long-term effects on agriculture due to competition between mining and agriculture for resources including water and land use (Adjei et al., 2021; Duncan, 2020).

Illegal gold mining causes disastrous effects on the environment particularly agricultural land, causing many people to view the activity as dirty and unsustainable (Ofosu-Mensah, 2010; Schueler et al., 2011; Ericsson and Löf, 2019; Atta and Tholana, 2021). Illegal mining has increasingly encroached on agricultural land, competing with farming for space and resources. (Ansah and Smardon, 2015; Danyo and Osei-Bonsu, 2016; Ndabi, 2017; Atta and Tholana, 2021). With agriculture

being one of the main sources of livelihood for the majority of people in Ghana (International Fund for Agricultural Development, 2011; Sugden, 2013; Andrieu et al., 2020), sustainable and productive agriculture should be given the necessary attention as its productivity relies greatly on access to quality land and water. Environmental Protection Agency (2016) estimated that the quality of land for agricultural use (in mining operation communities) is fast diminishing largely due to the activities of illegal mining. For example, in Nadowli-Kaleo District in the Upper West Region, illegal mining has impacted the environment resulting into loss of farmlands, destruction of crops and forest cover, and pollution of water bodies (Prosper and Guan, 2015).

Rural populations' livelihoods, especially those dependent on agriculture, are threatened by small-scale mining. One of the effects of these is the destruction of farmlands (Acquah, et al., 2020; Bagah, et al., 2016). Farming operations have been severely interrupted by mining (Addai, et al., (2025). The structure, fertility, and long-term production of the soil have been weakened by the use of dangerous chemicals. Farmers in affected regions have reported experiencing increased erosion and lower yields. For instance, Darkwa and Acquah (2022) document the experience of a middle-aged female farmer who stated: *"Our farms have been heavily affected, with regular erosions and a deterioration of the fertility of the soil; this has led to a lower yield of farm produce and a lowering in its quality because of the unsafe chemicals used on the land."* This account reflects broader findings that associate non-compliance with mining regulations with land-use conflicts and declining agricultural productivity.

The issue of soil erosion is further compounded by the absence of effective land reclamation measures. Boateng, (2018) and Asante, et al., (2007) note that frequent excavation of soil without restoration has worsened land degradation, negatively affecting both farmland and surrounding settlements. As a result, farmers' incomes and overall living standards are directly impacted. In addition to land-based challenges, small-scale mining also contaminates water sources that rural communities rely on for drinking, cooking, and sanitation. Water bodies such as rivers and streams are polluted by the proximity of mining operations and the discharge of toxic substances. The rise in mining activities may call for the altering of agricultural land into mining areas, affecting the availability of arable land for farming (Obodai, et al., 2024). Arifeen, et al. (2021).

3.3 Impact on Food Security



Food security according to (FAO 1996) exists “when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life”. More recent additions to this definition include social access to food (e.g. through social protection and safety net), governance, and right to food (Ballayram, & Fitzroy, 2015). The modern world's food security crisis is linked to illegal mining because factors like deforestation, global warming, increased floods, droughts, desertification, bush farming due to excessive gas emissions, biodiversity changes, and other harmful practices have a direct impact on food productivity. While food security continues to surge in developed countries, it faces a gradual decline in developing countries.

In Ghana, this is as a result of the substitution of arable lands for mining among other probable causes. The widespread practice of illegal mining has become a grave threat to the world's food supply. Communities are at risk of food insecurity as a result of this illegal activity, which does not only damages the environment; but, also threatens food production. Illegal mining and food security have a complicated relationship with wide-ranging effects that demand immediate response.

As of 2015, about 800 million people were chronically undernourished. A projected 161 million children under 5 years were malnourished. Furthermore, 500 million people were obese. Two billion people suffered from inadequate essential micronutrients for their health safety. The FAO estimated that to satisfy the growing demand driven by population growth and dietary changes, food production will have to increase by 60% by 2050 (Food and Agriculture Organisation, 2015).

According to Harvey, et al., (2014), flooding is by far the most disruptive weather extreme that affects mankind and their source of livelihood globally. Catastrophic flooding has occurred recently all over the world (Thomas, 2017), and a large

percentage of those affected live in rural areas, particularly in developing countries. Rural communities in developing countries, for instance, are particularly impacted by these flood extremes because of how heavily they depend on rain-fed agriculture and a low capacity to respond to climate-related disasters (IPCC, 2012).

Ghana is one of the vulnerable countries to floods in Sub Sahara Africa (Aggrey, 2015; Amoateng et al., 2018, Almoradie, et al., 2020) with devastating effects, especially for the urban poor and farmers in the northern part of the country (Okyere, et al., 2013). For example, in 2017, Ghana experienced extreme floods that affected about one million people (IFRC, 2017; Adegoke et al., 2019). Studies by Amoakwah, et al., (2020), and Bempah and Ewusi (2016) recorded cases of food poisoning as a result of “lead, cadmium or cyanide” and high levels and traces of metallic substances in aquatic foods and agricultural produce. Antwi-Boateng and Akudugu (2020) also indicated poor yields from farm lands and spikes in food prices (Agyei-Okyere et al., 2019; Botchwey et al., 2019) as causes of food insecurity resulting from illegal mining.

This affects vulnerable people such as women and persons differently-abled (Arthur-Holmes and Abrefa Busia, 2020). Hauserman, et al., (2018) have also indicated a chain of issues that leads to food insecurity such as destruction of the soil structure and hydrology as a result of the use of heavy equipment such as excavators. Further, the destruction of farm lands, abandonment of farming by farmers and moving into illegal mining because of the immediate returns, lead to shortages of food in markets with accompanying higher prices, which affect the expenditure of consumers.

3.4 Impact on Social & Economic Development



In Ghana, mining activities have an impact on society in both positive and negative ways. On one hand, mining contribute substantially to the nation's GDP, helps to improve infrastructure, creates jobs, and supports community development through corporate social responsibility (CSR) initiatives. On the other hand, it leads to social disruptions, conflicts, and displacement of local communities. One of the

positive social impacts of mining is the creation of employment opportunities. Mining activities require a workforce, that extend from skilled workers to supporting staff, creating jobs for individuals in communities. These jobs opportunities can help reduce poverty, improve livelihoods, and boost the overall well-being of local communities (Aryee, 2016). Furthermore, companies that mine often engage in corporate social responsibility initiatives to support community development. These initiatives can include the construction of schools, healthcare facilities, and community infrastructure, as well as investments in education and skills training programmes. Such contributions can improve social services, promote human capital development, and raise occupants' standard of living (Akabzaa & Darimani, 2001).

However, mining can also have negative social consequences. Mining activities can affect traditional livelihoods and cultural practices of local communities, which can lead to social tensions and conflicts. In many cases, mining operations have resulted in displacement of communities, leading to loss of land, homes, and access to natural resources (Aryee, 2016). To curb these negative social impacts, effective stakeholder engagement and community participation are of essence. Meaningful engagement can foster trust, promote social cohesion, and facilitate the development of mutually beneficial relationships between mining companies and local communities (Akabzaa & Darimani, 2001).

3.5 Impact on Education



Despite the multiple legislative frameworks, researchers indicated that there are millions of children who are involved in child labour in small-scale mining (Hilson, 2008). Nearly 70% of these young people labour in hazardous activities, such as mining, application of agricultural chemicals and pesticides, and use dangerous machinery. They also work as domestic staff in houses, behind the walls of workshops, and concealed from plantations. (Rajae et al., 2017). Another research

found that the majority of Nepali children working in mines and quarries began working before the age of 14, with 11% starting before the age of 8. This demonstrates that children work while in elementary or lower secondary school. They either mix job and study, or drop out of school (Hilson, G. 2012).

Mining activities have contributed to increase in school dropout rates among youth in Ghana's mining communities. In Akwatia, for instance, only 42 out of 88 pupils enrolled in school successfully completed their education, reflecting a dropout rate of 52.27%. Similarly, in Apinamang, located in the Kwaebibirem District, the dropout rate stood at 42.28%. An interview of six individuals engaged in illegal mining who had discontinued their education revealed that the primary reason for dropping out was lack of financial support from their families (Aubynn, 2009).

Many young individuals engaged in illegal mining believe that the income it generates offers a viable path to an improved livelihood. Although the dynamics of employment are complex shaped by various unobservable factors such as household preferences and familial expectations, empirical evidence indicates that child labour significantly undermines school attendance. In addition, many schoolchildren struggle to balance educational commitments with income-generating activities (Aubynn, 2009). Notably, in some mining communities, teachers themselves participate in illegal mining as a means of supplementing their low incomes. This practice does not only compromises their professional responsibilities; but, also inadvertently influences pupils and students to view mining as a more attractive alternative to formal education.

3.6 Impacts on Health



Illegal mining has become a major issue in many developing nations, particularly in resource-rich areas such as West Africa. In Ghana, the increase of uncontrolled

artisanal and small-scale gold mining, has created major environmental and public health issues. While the economic motives for illicit mining are widely established, the health risks are frequently disregarded. Prolonged exposure to dangerous compounds such as mercury and dust particles, along with a lack of protective equipment and poor working conditions, has led to an increase in respiratory ailments, skin problems, and other occupational illnesses. Itchy/red eyes, weariness, persistent headache, numbness, metallic taste, and skin rashes are the most common health concerns connected with toxic metals in ASM (Afrifa et al., 2017; Kumah and Adum Nyarko, 2018; Mensah et al., 2016).

Despite several research documenting increasing heavy metal concentrations in soil, water, food, and the human body, only a small number of studies report real health issues associated with heavy metal pollution. These studies primarily demonstrate a greater prevalence of illnesses caused by arsenic poisoning, including respiratory infections, diabetes mellitus, skin disorders, lung, liver, blood, and breast cancer (Armah et al., 2012; Attiogbe et al., 2020); Armah et al. (2012), neurological issues (Basu et al., 2011); and diarrhea (Attiogbe et al., 2020); and kidney disease and diarrhea caused by cadmium contamination (Attiogbe et al. (2020). Other research implemented hazard quotients and indices for health risk assessment, stating unacceptable cancer and non-cancer risks from pollution with multiple types of heavy metals (Ansa-Asare et al., 2015; Bempah et al., 2016; Bempah and Ewusi, 2016), or arsenic in particular (Akoto et al., 2018; Bortey-Sam et al., 2015a; A. K. Mensah et al., 2020), chromium (Armah and Gyeabour, 2013), or mercury. The dangers are greatest for children (Akoto et al., 2018; Armah and Gyeabour, 2013; Bortey-Sam et al., 2015b; A. K. Mensah et al., 2020).

Health concerns about radionuclides (naturally occurring radioactive particles that may come to the surface due to mining and pose lung cancer risks) were investigated but not found: all values remained below the ICRP and WHO reference levels in all studies (Doyi et al., 2013; Faanu et al., 2011; Klubi et al., 2020; 2017). Six studies have shown dangers in abandoned and exposed gold mining pits with polluted water (Baah-Ennumh and Forson, 2017; Ferring and Hausermann, 2019; Hausermann and Ferring, 2018; Kumah and Adum), Nyarko (2018; Ofosu-Mensah, 2017; Wan, 2014). These dangers include falling ('death traps'), drowning, and becoming mosquito breeding grounds, which increases malaria prevalence. Two studies investigate the consequences of dust exposure in LSM, with inconsistent results. In a study of miners in Ghana's Upper West Region, the expected effects on pulmonary and respiratory disorders, as well as vascular difficulties (e.g., high blood pressure and blood coagulability), were not found among self-reported health concerns (Antabe et al.). Ayaaba et al. (2017), Baah-Ennumh and Forson (2017), and Jonah and Abebe (2019) observed higher rates of respiratory infections and lung disorders (asthma, pneumonia, bronchitis, emphysema, and TB), whereas Antabe et al. (2017) noted odor discomfort from dust. One research reported on a cholera epidemic in East-Akim Municipality (Eastern Region), with 40% of the patients being galamsey

miners, which was linked to a lack of safe drinking water and sanitation at such mining locations (Opare et al. 2012).

Studies on injuries describe bruises, cuts, lacerations, contusions, and fractures caused by sliding and falling, being struck by (falling) items, or handling equipment and tools (Amponsah-Tawiah et al., 2014; Calys-Tagoe et al., 2017; Nakua et al., 2019b). These injuries were caused by the failure to wear personal protection equipment (PPE), excessive working pressure, overtime labour, and the use of outmoded equipment. The injury rate was higher among galamsey miners (29%) than company miners (23%), among workers in unlicensed ASM operations (6.1 injuries/100 person-years) than licensed ones (4.2/100 person-years), and among females (11.97/100 person-years) than males (5.03/100 person-years) (Calys-Tagoe et al., 2017).

Several research have examined the psychological impacts of mining. Wan (2014) links these to a misunderstanding of the cultural significance of farming, in which farmers risk losing their farms to mining activities or receiving inadequate compensation in the event of relocation. Adverse psychological consequences may also emerge from stress at work, continual noise, gender-based discrimination in the workplace, perceived unfairness, fear of losing farmed land, land grabbing, and worry about work safety, as well as adverse effects on health, livelihoods, and welfare in general. (Antabe et al., 2020; Hausermann and Ferring, 2018; Wan, 2014). Solastalgia is a type of distress caused by environmental and landscape change that results in a loss of sense of place and belonging (Antabe et al., 2020). According to Ferring and Hausermann (2019), women are experiencing psychological distress as a result of concerns about rising malaria infections in their children and the associated health costs; polluted water sources; and destroyed farming land, which puts pressure on the availability and price of cassava, plantain, and other food crops, causing them to worry about feeding their children adequately.

4. Challenges of Irresponsible Mining and Implications



Illegal mining poses challenges to environmental integrity, sustainable development, and the welfare of local communities. Illegal mining operates outside of the legal frameworks and regulatory control. It frequently results in deforestation, water contamination, and land degradation. In addition to harming the environment, illegal mining affects government revenues, weakens governance, and increases societal instability. The combined effects of these affect livelihoods, agriculture, and food security which are essential to resilience and survival of communities. These are discussed in detail below:

4.1 Challenges of Illegal Mining on Livelihoods

Illegal mining negatively affects local populations' livelihoods by destroying their conventional sources of income. Illegal miners frequently cause people to be displaced from their original homes. They disrupt farming activities, which are crucial for livelihoods and food security of communities. When individuals are displaced from their homelands, it has a significant impact on their livelihoods. Communities that have been displaced find it difficult to locate other sources of income, which result in poverty and unstable finances.

The cycle of poverty in these areas is deepened and social inequality is made worse by the lack of job opportunities and sources of income. Furthermore, social tensions and conflicts within impacted communities may occur as a result of illegal mining. Increased social inequalities and conflicts among community members may emerge from disputes over mining rights, resource access, and mutual benefits. In addition to undermining community cohesion, such disputes take money and attention away from community development programmes. When local livelihoods are destroyed,

it leads to food insecurity, a rise in poverty, conflict, and quality standard of living is compromised which slow down overall economic growth.

4.2 Challenges of Illegal Mining on Agriculture

Three billion people in rural areas rely on agriculture, with 475 million (80%) living on small farms globally (Gumbo et al., 2024). Ghana's economy is mostly dependent on agriculture for jobs, revenue, and food production. Agricultural production in mining communities has been threatened by illegal mining operations, especially in rural areas where farming is crucial for lives and food security. Crop yields and agricultural production suffer as a result of soil and water pollution and degradation of agricultural fields. This is attributed to pollution of soil by chemicals and heavy metals from illegal mining. These contaminants have the ability to seep into the soil and change its nutritional content and fertility. Commonly utilised in mining operations and heavy metals like lead, arsenic, and mercury can build up in the soil over time, endangering plant health and lowering plant growth and production (Amankwah & Anim-Sackey, 2021). Illegal mining reduces agricultural production, which has a number of negative impacts on the economy and food security.

Illegal mining can also damage water supplies, which are essential for irrigation and maintaining agricultural operations. Water bodies can get contaminated by the use of hazardous chemicals and the inappropriate disposal of mining waste, rendering them unfit for irrigation (Obiri et al., 2016; Mujere & Isidro, 2016). Irrigating crops with tainted water can harm plant development, lower agricultural yields, and make the crops unfit for human consumption (Amankwah & Anim-Sackey, 2021). This is evident when large amounts of water are utilised to process mineral ore (Suglo et al., 2021), when mining waste is dumped into waterways, and when seepage occurs from tailings and waste rock impoundments (Emmanuel et al., 2018). It has the potential to contaminate water bodies with heavy metals like mercury. According to studies, rivers, water and wells close to gold mining areas have significant concentrations of metallic mercury (Hg) (Malik et al., 2010). And when these waters move into agricultural lands, they may damage food crops. For instance, Tuffuor & Takora (2024) and Dube et al. (2024) observed a link between rising water and mercury use, and the increase in illegal mining-related activities. Additionally, most water bodies have become opaque brown due to debris and chemical components from illegal mining activities (Kusi-Ampofo & Boachie-Yiadom, 2012) as a result of runoff and wastewater from illegal mining, making them unsafe for residential and agricultural usage.

In addition to having an impact on farmers' lives, decreased agricultural output brought on by soil and water contamination also increases reliance on imported agricultural goods. Consequently, this strains foreign exchange reserves and impairs the agricultural sector's overall economic performance (Amankwah & Anim-Sackey, 2021).

Protecting agricultural lands and guaranteeing sustainable food production need the implementation of measures to prevent soil and water pollution, such as

appropriate waste management and the adoption of alternative mining techniques that reduce the use of harmful chemicals (Amankwah & Anim-Sackey, 2021). It also requires a multifaceted strategy to address the decline in agricultural output, including the promotion of ecologically friendly mining methods, sustainable land management practices, and efficient regulation and enforcement of mining operations.

4.3 Challenges of Illegal Mining on Food Security

One major negative effect of illegal mining is land degradation that affects agro-based livelihoods (Mkodzongi & Spiegel, 2019; Munyoka, 2020; Macheka et al., 2021; Magidi & Hlungwani, 2023). Land degradation is as a result of deforestation, making it susceptible to landscape destruction and soil erosion (Marther et al., 2020). This also makes fertile lands unsuitable for agricultural practices. The soil becomes unusable for farming when heavy rock material from open-pit mining is mixed with topsoil, which has extremely low water retention, low organic content, low nutrients, and highly poisonous components (Kinimo et al., 2018). For example, research on how mining affects agricultural lands and food security in Kyebi, Ghana's Eastern region, revealed that illegal mining operations have degraded the area, destroying crops and contaminating soils. This suggests that agricultural production and animal husbandry in rural areas may be negatively impacted by land degradation brought on by mining.

Ibrahim (2015) explains that the shift from agriculture to mining has led to poor yields, food shortages, reduced land for farming, and a drop in agricultural exports which puts local food supply at risk. Illegal mining also damages farmlands and forest reserves, affecting food security. Boadi et al. (2016) found that in two Ghanaian communities in the Offin shelterbelt forest reserve, 2.5 km² (4.4%) of the reserve was destroyed in just five years, with illegal mining alone causing 0.88% of annual degradation. Forest reserves help regulate rainfall and microclimate. Appiah et al. (2009) mentioned that local communities depend on farmlands for a living.

Boadi et al. (2016) added that illegal mining harms local people's lives and threatens sustainable forest management. They also found that it destroyed water bodies and cocoa crops, reducing farming from 90% to 76%, showing the financial harm caused. Danyo and Osei-Bonsu (2016) reported that from 2012 to 2016, food production in galamsey areas like Ashanti, Brong Ahafo, Eastern, Central, and Western dropped, while the Consumer Price Index in those areas was above the national average, affecting agriculture's GDP contribution. They concluded that galamsey is a major cause of low food production, high food prices, and high living costs.

Aborah (2016) found that food production in the Amansie West District of Ashanti steadily dropped from 2008 to 2012, especially for crops like yam, cocoyam, cassava, and plantains. Cassava decreased by 46%, yam by 82%, cocoyam by 43%, and plantains by 8%. Maize and rice production increased, but these were not from areas

affected by illegal mining. The total land under cultivation dropped from 12,911 Ha to 7,873 Ha, a 39% decrease.

Half of the miners had taken over land previously used for farming. Approximately, 51% of farmers said their land was taken, and 59% said they were not properly compensated. Farming labour also reduced as many joined mining. About 90% of the population in these farming communities support illegal mining, run by powerful local figures and foreigners, which leads to environmental damage, loss of plantations, pollution, poor health, and long-term poverty. Eshun et al. (2017) noted poor living conditions in mining areas, including polluted water, land loss, and job losses. Mensah (2018) added that people fear food insecurity because essential food has to be brought from cities due to reduced local farming.

4.4 Challenges of Illegal Mining on Social and Economic Development

Socially, illegal mining operations often lead to social conflicts, violence, and the breakdown of community structures. These negative social consequences erode social capital, undermining the cooperation, trust, and collective action necessary for sustainable economic development. The resulting instability can also deter investment and impede long-term economic growth (Tschakert & Singha, 2007). The influx of illegal miners - often from other regions or countries - strains local resources, heightens competition for limited opportunities, and triggers disputes over land ownership and access to mineral-rich areas. These tensions frequently result in social unrest and fractured community relationships. Social capital, which refers to the networks, trust, and shared norms that foster collective action, is critical to community resilience. Its erosion disrupts local cooperation, limiting the ability of communities to undertake joint development projects or manage shared resources effectively. Without trust and cohesion, members may be reluctant to collaborate, share resources, or invest in communal initiatives. The breakdown of social capital also deters external investment, as investors are generally attracted to areas with stable social conditions and supportive community networks. Regions affected by social conflict and violence linked to illegal mining tend to present high-risk environments, discouraging both public and private investment.

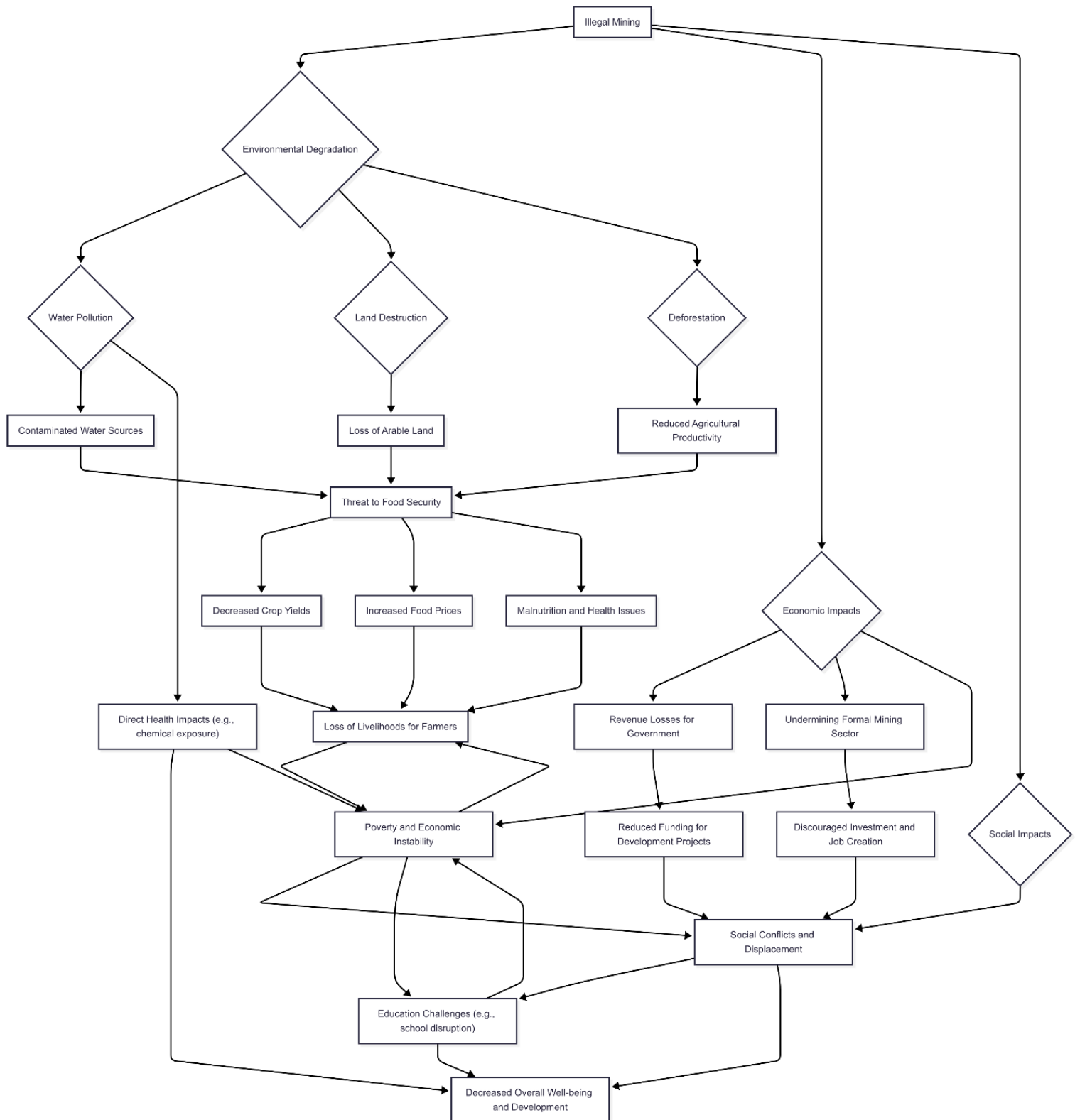
Additionally, weakened social capital hampers the implementation of effective governance and regulatory enforcement. Trust and cooperation among stakeholders - community members, regulators, and companies - are essential for ensuring compliance with mining regulations and addressing social and environmental concerns. When these relationships deteriorate, governance becomes fragmented and ineffective, exacerbating the harmful impacts of illegal mining. Mitigating the erosion of social capital requires inclusive governance, active community engagement, and platforms for dialogue. Strengthening community-based organisations, promoting social cohesion, and facilitating meaningful participation in decision-making processes are critical steps toward restoring trust and fostering sustainable and inclusive development.

Economically, illegal mining operations often evade taxes, royalties, and other regulatory fees, leading to substantial revenue losses for the Ghanaian government. This significantly limits the state's ability to fund development projects and deliver essential services (Hilson & Potter, 2005). Research by Crawford and Botchwey (2018) indicates that illegal mining has contributed to a notable decline in government revenue from the mining sector, estimating losses of approximately \$2.3 billion in tax revenue between 2010 and 2017. This deprives the government of critical funds needed for infrastructure, social services, and economic development initiatives. Unlike legal mining companies - which are required to pay corporate taxes, royalties, and comply with environmental and labor regulations - illegal miners operate outside the formal regulatory system. The informal nature of their operations makes it difficult for authorities to monitor their activities or ensure revenue collection. Additionally, limited enforcement capacity and resource constraints further weaken government efforts to curb illegal mining and recover lost revenue. This creates a vicious cycle of revenue losses which undermine the government's ability to invest in enforcement and regulatory infrastructure, which in turn allows illegal mining to flourish.

In addition to revenue loss, illegal mining distorts the formal mining sector. Operating informally, illegal miners avoid the costs associated with compliance such as labour protections and environmental safeguards; thereby, gaining an unfair cost advantage over legally operating companies (Hilson & Potter, 2005). This undermines the competitiveness of formal mining firms, discouraging investment, limiting expansion, and reducing job creation. Furthermore, the widespread reliance on illegal mining as a source of livelihood creates economic vulnerability for individuals and communities. Illegal mining is typically associated with irregular income, lack of social protection, and limited access to financial services. Without formal employment arrangements, many miners are excluded from health insurance, pensions, workplace safety protections, and other social safety nets. This increases their exposure to health and financial risks perpetuates long-term poverty and instability.

In many cases, economic hardship and limited alternative opportunities push individuals into illegal mining. However, the sector's informal nature inhibits long-term economic security. The lack of access to credit, savings, or formal financial systems restricts miners' ability to invest in education, entrepreneurship, or future planning.

Figure 1: A summary flow chat of the linkage between illegal mining and its impacts



5. Conclusion

Tackling illegal mining in Ghana requires a multifaceted approach that balances environmental integrity, economic development, and social justice. It demands political will, community participation, and sustained commitment to building a resilient and sustainable future for all Ghanaians. The persistent challenge of illegal mining in Ghana has emerged as a significant threat to the nation's environmental sustainability, economic stability, and social well-being. The widespread prevalence of artisanal and small-scale mining, often conducted outside the bounds of formal regulation, has led to profound environmental degradation, notably deforestation, land erosion, water pollution, and loss of biodiversity. These ecological issues directly undermine agricultural productivity - a sector vital to Ghana's economy and the livelihoods of a majority of its population. Furthermore, illegal mining has exacerbated food insecurity by encroaching on arable land, contaminating water sources, and decreasing the land's fertility. The displacement of farming communities, coupled with the loss of productive farmland, results in reduced food production, increased food prices, and heightened vulnerability among rural populations.

Additionally, the economic impacts are not limited to environmental damages; significant revenue losses occur due to tax evasion, and the formal mining sector is undermined by unfair competition, discouraging investment and employment. The social implications are equally grave. Many individuals involved in illegal mining operate in hazardous conditions, often lacking social protections, health safeguards, and/or access to credit. This informal sector perpetuates cycles of poverty, economic instability, and community disintegration. Without a cohesive strategy that combines strict enforcement, community participation, and sustainable development, the cycle of illegal mining is likely to persist, further jeopardising Ghana's long-term prospects for growth and environmental preservation.

6.Recommendations

Enhanced Regulatory Enforcement and Legal Reforms



Strengthening regulatory enforcement is essential to effectively monitor and implement mining restrictions. This requires a comprehensive investment in institutional capacity, including adequate and sustained funding, modern equipment, and continuous training of enforcement personnel. Legal

frameworks must be reviewed and reformed to eliminate loopholes, clarify mandates, and ensure swift and deterrent prosecution of illegal mining. Moreover, introducing clear incentives and support mechanisms for miners to transition into formal, sustainable practices will help promote compliance and reduce resistance. Coordination among enforcement agencies, judiciary, and local authorities must also be improved to ensure cohesive and transparent implementation of mining laws.

Community-Based Approaches and Participatory Governance



Engaging local communities as active partners in environmental stewardship and land governance is critical to achieving lasting solutions. By fostering inclusive decision-making processes and recognising traditional knowledge systems, communities can play a central role in safeguarding natural resources. The establishment of local monitoring committees and well-structured community mining programmes can enhance

transparency, build trust, and promote a sense of ownership and accountability. These participatory approaches not only empower residents to take charge of their environment; but, also help reduce the economic and social appeal of illegal mining by offering legitimate and locally accepted alternatives.

Promotion of Sustainable Alternative Livelihoods



Diversifying rural economies must be prioritised by the government in collaboration with development partners to reduce dependence on illegal mining. This involves targeted investments in artisanal industries, sustainable agriculture, ecotourism, and skills-based vocational training tailored to local contexts. Supporting value chains in agro-processing, renewable energy, and climate-resilient enterprises can create meaningful employment and long-term income opportunities. By providing viable economic alternatives, communities are less likely to resort to environmentally destructive practices, thereby contributing to both poverty reduction and ecological preservation.

Environmental Rehabilitation and Education



Comprehensive land restoration programmes are crucial to reversing the environmental damage caused by illegal mining. Large-scale reclamation initiatives should focus on reforestation, soil restoration, and rehabilitation of water bodies to revive ecological integrity and support livelihoods. Equally important is sustained environmental education through public awareness campaigns that inform communities about the long-term social, economic, and ecological costs of illegal mining. By promoting a culture of environmental responsibility and stewardship, these efforts can empower citizens especially the youth to actively participate in conservation and sustainable resource management.

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