

# **An In-Depth Systematic Literature Review of the Effects of Mining Activities on Land Tenure Systems in Ghana**

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**Keywords:** Mining, Land Tenure, Livelihood, Sustainability

## **SUMMARY**

The extractive industry is indispensable for advancement, and this is particularly so for developing countries like Ghana, as it drives economic growth by generating revenue and creating job opportunities for millions of people. Nonetheless, their activities result in the deprivation of people's right to surface land, predominantly held under customary land tenure with agriculture serving as the mainstay of livelihood. The tenets of customary land tenure is that land is owned by a vast family, many of whom have passed away, very few of whom are still alive, and limitless numbers of whom are yet to be born. Mining activities have extensive repercussions for the land tenure system resulting in the displacement of people, loss of land rights, reduced control and access to land, and land fragmentation. All of these impact the economic, environmental, and social conditions of the people in the community. This systematic review provides a thorough analysis of the impact of mining on the land tenure system in Ghana, revealing the complex dynamics, challenges, and possible remedies. To achieve this, a vast range of academic journals, research papers, books, reports, policies, and legal documents were critically reviewed. The research reveals the challenges faced by mining-induced communities as a result of the displacement which has resulted in the loss of ancestral lands and disruption to community life. The displacement is also coupled with economic disparities, social tension, and land tenure disputes. Also, the consequences of environmental degradation such as deforestation, water pollution, noise, and air pollution have dire consequences on land use and ownership, particularly for communities dependent on natural resources. The review brings to light various responses and effective strategies to mitigate the negative impacts of mining on land tenure in Ghana. These include strategies involving community engagement, corporate social responsibility initiatives, and legal reforms. Also, the review uncovers that when mining licenses are renewed, individuals who have been expropriated are compensated for the deprivation of land use. However, after mining activities cease, the land often does not revert to its former owners; instead, it becomes the property of the government. This underscores the need for a review of the law governing mining, sustainable mining practices, and environmental management to safeguard the land tenure system. This review enlightens policymakers, researchers, mining enterprises, and local communities regarding the intricacies of this convergence, offering a foundation for well-informed decision-making. It underscores the crucial importance of upholding sustainable development, social fairness, and responsible resource management within the framework of Ghana's diverse land tenure traditions.

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## **1. INTRODUCTION**

Globally, land is a valued asset characterized by abundant natural resources including water, vegetation, soil, and minerals (Kamga, 2023). In Ghana, land holds significant importance due to its rich and abundant natural resources encompassing arable lands, forests, waterbodies, and mineral deposits. The country's economic foundation is predominantly agrarian featuring noteworthy forests like the Atewa Range Forest Reserve, substantial water bodies such as Lake Bosomtwe, and diverse mineral resources, including manganese, bauxite, gold, diamonds, and crude oil (Baah and Kidido, 2020; Amponsah- Tawiah and Dartey-Baah, 2011). The mining industry is indispensable to the nation's socioeconomic development. Gold has been the cornerstone of the extractive industry's success as it is the predominantly mined mineral accounting for about 97% of the total mining revenue in 2021 (Ghana Chamber of Mines, 2021). Historically referred to as the "Gold Coast", Ghana's extensive gold deposits cover nearly one-sixth of its land area, emphasizing the nation's significant role in gold production (Hilson and Hu, 2022). Ghana emerged as the continent's top gold producer in 2018 (Ghana Chamber of Mines, 2019) and the world's sixth-largest gold producer in 2020 (Adator et al., 2023). The GDP contribution of the mining industry grew from 9.6% in 2021 to 13.7% in 2022 (Ghana Statistical Service, 2023). The growth has not only boosted economic indicators but also created direct and indirect employment opportunities for approximately 5.5 million individuals (McQuilken and Hilson, 2016). The scale and operational approach within the mining sector has resulted in its classification into two distinct categories: Small-scale mining (SSM) and Large-scale mining (LSM). There are 16 large-scale mining companies consisting of multinational corporations such as AngloGold Ashanti Limited and Newmont Gold Ghana Limited (NGGL) (Ghana Minerals Commission, 2023). Conversely, small-scale mining manifests in three distinct forms: legally recognized small-scale mining, artisanal small-scale mining (ASM) and illegal small-scale mining.

In diverse socio-cultural and political contexts, mining operations give rise to intricate resource tenure issues with overlapping statutory and customary laws (Buxton et al., 2021). Approximately 78% of Ghana's total land is comprised of customary land (Schoneveld and German, 2014). However, this poses complexities as minerals beneath the soil are vested in the President who acts on behalf of and in trust for the Ghanaian people (1992 Constitution of Ghana). Employing the Mineral and Mining Act, of 2006, mineral-rich lands are appropriated and mining concessions are granted to companies for mineral extractions. This subsequently leads to displacement as people leave their homes and ancestral lands, leading to the forfeiture of their land rights. In Ghana, mining operations significantly impact land tenure systems giving rise to intricate challenges related to land ownership, displacement, and compensation,

This is exemplified by the operations of NGGL who have acquired nearly all the farmlands in the Kenyasi and Ntotroso communities (Adator et al., 2023). The sector alters the conventional norms governing land use, ownership, and access to land (Adator et al., 2023). It changes the socio-economic structure of these communities, affecting their way of life. Additionally, mining causes the loss of land rights and undermines the community's strong cultural heritage and spiritual ties to their ancestral lands, which weakens their sense of identity and culture (Brawner and Baguilat, 2011). Numerous studies have delved into the repercussions of mining. Research by Obeng et al. (2019) and Barenblitt et al (2021) focused on the effects of mining on forests and ecosystems, while the work of Faseyi et al. (2022) and Mensah et al (2022) centered on the impact on water and health. Additionally, Suglo et al. (2021) scrutinized how mining influenced the economy and agriculture. However, there is limited research specifically addressing the impact of mining on land rights. The 2011 study by Ayitey et al., concentrated on compensation payments for land use deprivation in mining communities. Botchway (1998) explored land ownership and responsibility of the mining environment in Ghana, drawing on the Mineral and Mining Act of 1986. However, given the substantial changes brought about by the Mineral and Mining Act of 2006 (Act, 703), a recognized knowledge gap exists, underscoring the necessity for additional exploration in this domain. To fill this gap, this research aims to unravel the intricate relationships between land tenure regimes and mining operations. This paper employs a systematic review methodology, meticulously gathering comprehensive evidence on mining operations in Ghana. The study aims to provide a compressive understanding of the multifaceted relationship between land tenure systems and mining activities. Central to this review is the investigation of the following questions: 1) What are the legal and policy frameworks in the land and mining sector? 2) What are the alterations in land ownership structures and land tenure systems resulting from the expansion of mining operations? 3) What environmental and socio-economic consequences do mining activities have on communities' access to and utilization of land resources?

The study provides insightful information for the various stakeholders such as the local communities, mining companies, policymakers, and researchers. The research educates the populace on the impact of mining activities on their land rights, and livelihood. The study provides new perspectives and research opportunities while adding to the body of knowledge. The study promotes equitable and sustainable land tenure policies, safeguarding community rights.

## **2. HISTORICAL CONTEXT**

Ghana has a long history of mining that predates written history, with disputed assertions regarding the exact start period of mining. While some suggest occurrences as early as the 4<sup>th</sup>, 5<sup>th</sup>, and 6<sup>th</sup> centuries (Junner, 1935; Gbireh, 2007), conflicting claims arise from historical records. Allen (1958) argues that concrete evidence supports gold mining only from the 10<sup>th</sup> century. In the 14<sup>th</sup> century, Ghana gained recognition as the "land of gold," depicting its abundant mineral resources (Hilson, 2002). During the pre-colonial era, gold extraction was relatively simple and small-scale, primarily utilizing alluvial gold mining, collecting gold grains from various sources like streets, ditches, and riverbanks (Ofosu-Mensah, 2017; Hilson, 2002; Allen, 1958) In 1471, the Portuguese explored the African coast, reaching Ghana and dominating the gold trade (Hilson, 2002). Forts were erected to facilitate transcontinental trade,

marking a prosperous period that later declined with the onset of the slave trade in the 18th century, only reviving after its abolition in the 19th century (Allen, 1958). The first significant attempt at large-scale gold mining in Ghana was led by Pierre Bonnet in Tarkwa and Axim in 1878 (Hilson, 2002). The Gold Coast Geological Survey, established in 1913, played a crucial role in identifying valuable mineral deposits (Allen, 1958).

Post-independence in 1957, the government took steps to regulate the mining industry, leading to the creation of the State Mining Corporation in 1961 (Hilson, 2002). Subsequent legislation in the 1980s aimed at attracting foreign investments and promoting private sector involvement, marking a pivotal shift toward privatization and sustainable management of mineral resources in Ghana (Hilson, 2002). Numerous laws have been passed to govern the mining industry.

## **2.1 Land Tenure**

The significance of land in fostering economic development is underscored by its role in sustaining livelihoods (Boamah, 2014). The universal desire for access to land for economic endeavors necessitates the establishment of a structured framework for sustainable management—termed land tenure. Various definitions abound, encompassing arrangements that establish rights, responsibilities, ownership, use, and transfer of land either legally or customarily (Kasanga and Kotei, 2001; FAO, 2002; Nchanji et al., 2023). The system is multifaceted, involving economic, legal, technical, political, and institutional factors (FAO, 2002). Land tenure is categorized into overriding, overlapping, complementary, and competing interests. (FAO, 2002). Bromley (1991) categorized property regimes into private, communal, open access, and state properties. Ghana has a dual system of land tenure: customary and statutory land tenure (Arko Adjei, 2011). Ghana has a diverse ethnocultural landscape that influences customary land tenure, while statutory lands are held by the government (Cudjoe, 2017; Asaaga, 2021). The inheritance of land follows customary rules, reflecting cultural and regional variations (Lambrecht and Asare, 2015). In the customary land tenure system of Ghana, the community entrusts land to leaders such as chiefs, skin, family, or clan heads (Addaney et al., 2022). These leaders are considered land overlords, and they hold major interests and complete ownership of the land in trust for the people (Mends, 2006; Asante 1965). The leaders confer with the council of elders on land management, judicial, and governance matters (Kasanga and Kotey, 2001; Mends, 2006). The traditional leaders allocate land for various uses, ensure conservation, and act as mediators in land-related conflicts (Olaopa and Ogundare, 2023).

Ghana has undergone various land tenure reforms aimed at restructuring land rights for sustainability and equitable access (Narh, 2016; Manji, 2006; Coldham, 1982). Land tenure reforms are influenced by economic, religious, demographic, and eminent domain (Mends, 2006). Traditionally, land tenure was based on a subsistence economy with land being granted to leaders for little to no rent (Obeng-Odoom, 2016). However external influences like gold interest, colonization, and transition to a market-oriented market have changed the land tenure system (Obeng-Odoom, 2016). Post-independence reforms such as the National Land Policy and Land Administration Project were set to address inefficiencies in land administration and emphasize equity and sustainable practices (National Land Policy, 1999; Karikari et al., 2002)

## **2.2 Legal and Policy Framework**

The Lands Bill of 1897, was put forward to vest all lands to the government, however, this proposal faced significant resistance from the indigenous population and was subsequently withdrawn (Botchway, 1998). The Concession Ordinance, which recognized indigenous people's interest in land, was passed in 1900. There were limitations imposed on the duration and size of the granted concession, with a maximum of ninety-nine years and not exceeding five square miles, respectively. This Ordinance was later replaced by the Concession Ordinance of 1939. In 1962, the Concession Act was passed to replace the Concession Ordinance of 1939 to regulate mining concession. Additionally, the Land Registry Act of 1962 was implemented for the voluntary registration of any instrument related to land, particularly deed registration. Subsequently, in 1986, the Land Title Registration Law was introduced to formalize the registration of land titles. The Lands Act of 2020 (Act 1036) has also been passed to ensure efficient and effective land tenure consolidation of land-related laws and ensure sustainable land administration and management. The Mineral and Mining Law of 1986 (PNDCL, 153) was enacted to regulate the mining sector which was amended in 1994. The Mineral and Mining Bill of 2005, was established, and through it came the Mineral and Mining Act, 2006 (Act 703). Act 703 established the duration of a mining lease and recognized the deprivation of land use. Additional legislation including the Mineral and Mining (Amendment) 2015 (Act 900), Mineral and Mining Regulation (LI, 273), and Mineral Development Fund Act 2016 (Act 912), have been introduced within the mining industry. To enforce mining laws effectively, regulatory bodies such as the Minerals Commission regulate mineral resources (Minerals Commission Act, 1993, Act 450), and the Environmental Protection Agency (EPA) ensure environmental compliance (Environmental Protection Agency Act, 1994 (Act 490). These bodies collaborate to streamline licensing processes, monitor environmental impact assessments, and enforce health and safety standards (Minerals Commission Act, 1993; Environmental Protection Agency 1994).

## **3. METHODOLOGY**

This research examines the effects of mining activities on the land tenure system in Ghana, with a specific focus on the country's extensive history of gold mining. The study employs a systematic review methodology which includes formulating review questions, conducting a thorough literature search across diverse academic databases, and screening and selecting studies according to clearly defined inclusion and exclusion criteria (Kangura et al., 2012). In the establishment of the inclusion and exclusion criteria, the chosen publication date encompassed peer-reviewed journals published from 1935 onwards, excluding those published before 1935. The language criterion involved selecting articles in English while excluding those in languages other than English. For article type, only those available in full text to the author were included and those that were not were excluded. Additionally, articles accessible through electronic databases were included. The main theme criterion encompassed articles especially addressing the impacts of mining on land tenure, excluding articles that did not distinctly focus on the relationship between mining and land tenure. Multiple searches were conducted to ensure a rigorous methodology and comprehensive coverage of relevant information. The data were gathered through electronic searches of databases such as Scopus, Springer, Taylor and Francis, Research Gate, Wiley Online Library, JSTOR, Elsevier, Science Direct, Sage Journals,

Semantic Scholar, Google Scholar, and Google search, using variations and combinations of keywords related to land tenure, impact, benefits, effects, land management, land administration, mining (including small scale, large scale, ASM, illegal mining).

Considering the historical context of mining, the research timeframe encompassed literature from 1935 to 2023 ensuring inclusion of all pertinent discussion and literature on the subject. The review focused on published literature, with additional scrutiny of references in retrieved peer-reviewed publications to identify any relevant literature missed in the initial search. Out of 495 initially retrieved papers, 255 remained after removing duplicates, and further screening resulted in 183 studies meeting the inclusion criteria.

The analysis of the effects of mining on land tenure in Ghana involved a systematic review encompassing both qualitative and quantitative empirical studies. The methodology includes a comparative analysis of identified strategies, highlighting their effectiveness, limitations, and contextual factors influencing their application. The research also assessed the rigor and validity of the findings. By adopting a literature review approach, the paper provides a comprehensive overview of the current state of knowledge in the intersection of mining and land tenure in Ghana.

#### **4. RESULTS AND DISCUSSION**

The findings derived from the systematic review offer intriguing perspectives on the broader dimension of mining and land tenure. The information gleaned from the analysis of relevant articles is arranged in this section based on the review's identification of the major themes. Per the outcomes of the MAXQDA analysis, the themes addressed in this section encompass community support, change in land tenure, socio-economic impact, and environmental consequences with a focus on health, water, air, noise, vegetation, and destruction of farmlands.

##### **4.1 Community Support**

The mining companies provide several corporate social responsibility initiatives and community engagement. For instance, NGGL has implemented programs such as the Agricultural Improvement and Land Access Program (AILAP) and the Skills Development for Income Improvement Program (SDIIP) in addition to engaging in infrastructural projects, community health initiatives and providing support for education and training (Kapstein and Kim, 2011). Newmont Corporation (2021) disclosed the presence of the Newmont Ahafo Development Foundation (NADeF) in Ahafo, which, as of December 2018, had accumulated over \$25 million. These funds have facilitated approximately 120 infrastructure projects and granted more than 8700 scholarships to students pursuing secondary and tertiary education. AngloGold Ashanti Limited has similarly introduced a ten-year socio-economic development plan aimed at ensuring sustained benefits for the Obuasi mine and its surrounding communities from mining activities (AngloGold Ashanti, 2022).

##### **4.2 Change in Land Tenure**

Article 20 of the 1992 Constitution stipulates that the government is empowered to compulsorily acquire any property for public interest and benefit, provided that fair, adequate, and prompt compensation is offered. Furthermore, Article 20(6) of the same Constitution specifies that if the acquired property is not utilized for the intended public interest or purpose,

the original owner, before the compulsory acquisition is granted the first option to reacquire the property based on the value of the property at the time of the re-acquisition. This implies that the use of compulsory acquisition terminates the interest of the previous owner in the land. However, the process of acquisition for mining differs significantly. As per sections 73 and 74 of Act 703, compensation payment encompasses the deprivation of land use. Compensation for land use deprivation is designed to address the period of the mining lease, along with an additional duration allocated for the regeneration of the mined land (Ayitey et al., 2011). The Mineral and Mining Act 2006 (Act 703) established the duration of a mining lease to be 30 years for large scale and 5 years for small scale, subject to renewal. This indicates that the former owners of the property retain a reversionary interest. Botchway (1998) supports this notion, asserting that lands acquired for mining purposes under post-colonial laws may still leave a reversionary interest with the original owners. Therefore, the renewal of a mining lease triggers a re-compensation process for the deprivation of land use. Consequently, it begs the question of whether or not the inhabitants receive their land back after the mining lease. In 2016, AngloGold Ashanti Limited relinquished about 70% of its initial mining lease to the Minerals Commission which was designated for community mining (Citi News, 2022). There are no records of the original proprietors regaining access to their lands or receiving additional compensation for deprivation of land use. Furthermore, this shifts the land tenure from customary to state-owned impacting the community's identity as according to Asante (1965), the land is the most valuable heritage of the community.

#### **4.3 Environmental Consequences:**

Before colonization, the indigenous people employed simple tools and techniques for small-scale gold extraction that had minimal impact on the environment (Boateng, 2018). However, colonization led to the introduction of heavy machinery and sophisticated mining techniques, causing significant environmental disruptions (Boateng, 2018). The examination of the effects of mining has been categorized into subtopics, exploring its impact on various aspects such as health, water quality, vegetation, agriculture, and more.

##### 4.3.1 Health

Gold mining, whether conducted on a small scale or large scale is associated with the routine discharge of toxic chemicals like mercury, cyanide, and arsenic into waterbodies posing significant health risks (Akpalu and Normanyo, 2017). Exposure to these harmful chemicals poses severe health complications such as skin issues, cardiovascular diseases, neurological damage, and respiratory infections (Davies, 2014; Suglo et al., 2021). Additionally, mercury exposure has adverse effects on male and female fertility, pregnancy loss, menstrual disorders, and fetus development (Bjørklund, 2019; WHO, 2017). Furthermore, the machinery utilized in mining operations contributes to air pollution, leading to respiratory ailments like flu, asthma, and cold in affected communities (Akabzaa and Darimani, 2001).

##### 4.3.2 Water Pollution

Good quality water is significant for human health and environmental well-being (Obiri-Yeboah et al., 2021). Mining operations contribute to water pollution by introducing harmful chemicals to waterbodies. Globally, ASM emits close to 880 tonnes of mercury annually (Obrist

et al., 2018; Kocman et al., 2017). Illegal mining without regulation utilizes hazardous chemicals like mercury and cyanide which are released directly into nearby waterbodies (Suglo et al., 2021). This pollutes both surface and groundwater (Suglo et al., 2021). Aboka et al. (2018) reported that water pumped from boreholes was polluted due to contamination of underground water aquifers. Their research also indicated a significant compromise of water resources in Obuasi, particularly in rivers Kwabrafo, Jimi, and Pompo. Duncan (2020) reported elevated concentrations of cadmium (Cd), lead (Pb), and iron (Fe) in the Fena River in Amansie Central, Ashanti Region. Similarly, Afun and Owusu (2016) documented iron (Fe) levels in the Birim River exceeding the World Health Organization (WHO) guidelines. This presents a serious obstacle to the nation's sustainable water management (Ofosu and Sarpong, 2022). This was demonstrated in 2011 as severe pollution of the Birim River caused by illegal mining activities caused the Ghana Water Company Limited (GWCL) to temporarily close the Kibi Treatment Plant (Amankwa, 2013).

#### 4.3.3 Air and Noise Pollution

Machinery used for mining operations pollutes the air (Akabzaa and Darimani, 2001). Also, the use of machinery such as heavy earth-moving machines, generator-powered grinding machines, and dynamites leads to earth-moving machine, dynamites, and noise pollution in the community which can lead to the risk of noise-induced hearing loss (NIHL) which will affect both the miners and the community at large (Aboka et al., 2018).

#### 4.3.4 Vegetation

Mining activities result in the degradation of forest cover, causing harm to biotic features and vegetative ecosystems. Hansen et al. (2009) identified mining as a significant contributor to the reduction of rainforests in Ghana. The destruction of forest cover is concerning as these act as crucial carbon sinks, playing a role in mitigating greenhouse gases and addressing climate change.

#### 4.3.5 Destruction of farmlands

The agricultural industry stands as the cornerstone of the economy, occupying approximately 57% of the total area of land and contributing 20.9% to the GDP in 2022 (MOFA, 2019; Ghana Statistical Service, 2023) surpassing the mining sector. Despite its significance, mining operations encroach upon fertile agricultural lands displacing farmers (Brown and Kimani, 2021). Mining and agriculture are often mutually exclusive, hence increased mining activities lead to the destruction of farmlands by removing topsoil, trees, and vegetation rendering the land infertile and unsuitable for diverse agricultural activities (Suglo et al., 2021; Brown and Kimani, 2021). Schueler et al., (2011) highlighted a substantial loss of agricultural land, with about 4,935 hectares or 45.2% in the Tarkwa, Bogoso/Prestea, and Daman concessions. Newmont Ghana Gold Limited (NGGL) has displaced numerous farmers in the Asutifi-North District, acquiring nearly all the farmlands in the Kenyasi and Ntotroso communities (Worlanyo et al., 2022; Adator et al., 2023). This causes diminished agricultural productivity, decreased food security, and loss of vital agrarian labor force (Brown and Kimani, 2021).



#### **4.4 Socio-Economic Impacts**

Land ownership is seen as the foundation for both riches and political power. Owning land confers social authority and prestige (Bymolt et al., 2018; Mends, 2006). The recognition of the social, political, and spiritual aspects of land makes the community's residents feel like they belong (Shipton, 2009). However, mining-related displacement disrupts the community's established socio-political structures and erodes its feeling of cohesion (Wetzlmaier, 2012).

Mining is progressively diminishing arable land and displacing farmers, impacting their economic well-being. A study conducted by Ayinpoya et al (2021) in the Talensi District of the Upper East Region revealed that the majority of the population (83%) relies on agrarian sources for income. However, mining activities displaced a significant number of farmers, leading to a substantial reduction in their annual income contributing to food insecurity, particularly among expropriated households (Ayinpoya et al., 2021). Also, mining activities displaces farmers leading to unemployment (Adator et al., 2023). This compels some affected farmers to partake in illegal small-scale mining, thereby causing adverse environmental consequences (Worlanyo et al., 2022). Amoah-Frimpong (2013) disclosed that the prevalence of mining taking over agricultural land resulted in a doubling of food prices for domestic food production. Moreover, the community experienced a surge in population due to gold extractions, influencing food prices and rendering living conditions unbearable (Ayinpoya et al., 2021).

Furthermore, compensation payment under section 74 includes compensation for deprivation of land use, loss or damage to immovable properties, in the case of land under cultivation, loss of earning of sustenance suffered by the owner or lawful occupier, having regard to the nature of their interest in the land and loss of expected income, depending on the nature of crops on the land and their life expectancy. However, the displacement of community members results in intangible losses which Turner et al. (2008) categorized as loss of identity, emotional and psychological losses, cultural and lifestyle losses, loss of self-determination and influence, and loss of opportunity. The compensation calculations do not account for these intangible losses. Ayimpoya et al., (2021) asserted that the compensation payments are inadequate.

#### **4.5 Recommendation**

Based on the results presented, the following recommendations are proposed: There is a pressing need for stringent monitoring and enforcement of environmental impact assessment to check the potential impact of mining on land, water, air, and noise quality. Furthermore, mining companies need to continue their community development programs such as agricultural enhancement, educational and infrastructural development as well as initiatives for skill development. There should be legislation reform to protect the land rights of the community in mining areas. Additional research is essential to collect primary data and delve deeper into the topic, offering concrete evidence on the outcomes of mining companies that have concluded their operations and the subsequent status of their lands. Furthermore, an examination of the government strategies and plans concerning the decommissioning of mining lands warrants further investigations.

## 5. CONCLUSION

To sum up, the effects of mining on land tenure are complex and have a significant influence on residents, landowners, and the larger socio-economic structure of impacted communities. The substantial alterations brought about by mining have prompted serious concerns about the efficiency and equity of the current legal and regulatory systems. The evidence presented indicates that mining operations cause adverse socio-economic impacts on displaced farmers, including a decline in income, food insecurity, and deteriorating living conditions. To safeguard the environment, foster economic progress, and uphold the rights of the local population, there is a need for amendments to the Mineral and Mining Act. Additionally, rigorous monitoring and enforcement of environmental impact assessments should be implemented.

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## **BIOGRAPHICAL NOTES**

Currently, I am pursuing my Ph.D. at Kwame Nkrumah University of Science and Technology and hold the position of Graduate Assistant at the Department of Land Economy, KNUST. My responsibilities include engaging in research works and assisting lecturers with teaching and supervision of students' works. I also engage in valuation and research projects. Noteworthy works I have contributed to include the valuation of Kwame Nkrumah University of Science and Technology (KNUST) Total Assets in 2019-2020 and active participation in the World Bank Project of Ghana Regulatory Review: Laws, Policies, and Institutions related to Environmental and Social Risk Management in 2019-2020.

I gained valuable internship experience at Gold Street Real Estate Consult from 2013 to 2014 and the Lands Commission in 2012. During my time at Goldstreet, I played a role in site inspections, assessments, and negotiations for crop compensation for farmers affected by expropriation due to AngloGold Ashanti Mining activities in Obuasi. Additionally, I contributed to the project titled 'Innovative Tools to Secure Land Rights in West Africa,' sponsored by the Bill Gates Foundation and coordinated by the International Institute for Environment and Development.

In terms of awards, I received the Surv. Dr. Mrs. Matilda Esi Fiadzigbeys Award of Excellence: Best Female Trainee in 2021 from the Ghana Institute of Surveyors- Valuation and Estate Surveying Division. I also received a full scholarship for the Technical University of Munich (TUM) Africa Talent Programme in 2023. In 2016, I was awarded a Commonwealth Shared Scholarship for my master's program in the United Kingdom.

As for professional affiliations, I am a member of the Ghana Institute of Surveyors and the Chartered Institute of Water and Environmental Management (CIWEM, UK). While I haven't published any works, I am a reviewer for Environment, Development, and Sustainability (ENVI) under Springer Link.

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