Addressing the Challenge of Illegal Small-Scale Mining (Galamsey) in Ghana: A Call for Sustainable Solutions

B. Baffoe[1*], A.K. Kodie[2], A.T. Kabo-Bah[2,3]

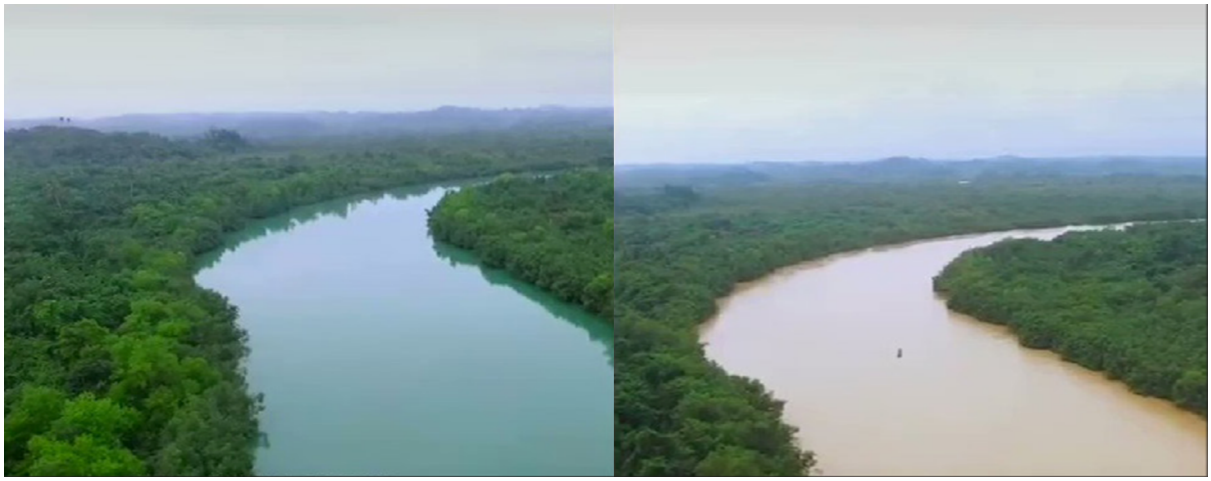
[1]Department of Fisheries and Water Resources,
University of Energy and Natural Resources, P. O. Box 214, Sunyani, Ghana

[2]Department of Civil and Environmental Engineering,
University of Energy and Natural Resources, P. O. Box 214, Sunyani, Ghana

[3]International Relations Office,
University of Energy and Natural Resources, P. O. Box 214, Sunyani, Ghana

[*]Corresponding author: belinb77@gmail.com

Graphical Abstract



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Abstract

Illegal small-scale mining, also known as galamsey, is a threat to Ghana's sustainable growth, posing serious environmental degradation and gross socio-economic effects. Drawing on Ghana's mining industry and comparative cross-case international studies, this paper integrates evidence to provide a holistic analysis of the galamsey phenomenon and the transformational potential of formalization. This research proves that unregulated mining operations have contaminated 60% of water bodies in the mining regions in Ghana, rendered 30% of arable land unusable, and triggered violent conflicts over mining territories. The study shows that the successful implementation of strategic formalization in Tanzania and Burkina Faso, has the tenacity of improving three key areas: (1) environmental protection (reduction in mercury pollution (85%)), (2) economic benefits (increase in government revenues (350%)), and (3) social welfare (reduction in the workplace fatalities (62%)). The study identified four critical factors: digital licensing systems that cut down bureaucratic barriers, cooperative models that ensure improved accessibility to financing and technology, comprehensive training programs in sustainable mining practices, and integrated monitoring combining satellite surveillance and community participation. This paper emphasizes that successful formalization implementation requires strategies that go beyond regulatory changes. It requires an inclusive strategy that integrates policy reform, institutional capacity building, and community engagement. The paper presents a comprehensive phased implementation framework that aligns with Ghana's commitments under the Africa Mining Vision and adds to achieving SDGs 8, 12, and 15. We conclude with evidence-based recommendations for policymakers, emphasizing the importance of sustained political will, predictable resource allocation, and genuine multi-stakeholder engagement.

Keywords: Small-Scale Mining; Galamsey; Formalization; Pollution.

1 Introduction

Illegal small-scale mining, commonly known as "galamsey," is still a critical environmental and socio-economic challenge in Ghana (Aryee et al., 2020). Irrespective of government interventions, including policy reforms and law enforcement measures, the practice persists due to high unemployment, weak regulatory enforcement, and the lucrative nature of artisanal gold extraction (Hilson, 2021). The environmental impacts of galamsey are severe and contribute to deforestation, land degradation, and the contamination of water bodies with toxic chemicals such as mercury (Mantey et al., 2020). Studies depict that polluted water sources have led to long-term ecological damage and public health crises in mining communities (Bempah & Ewusi, 2022). The social and economic consequences of illegal mining go beyond environmental degradation. It also implies conflicts involving violence in mining communities, loss of revenue to governments, and heightened health risks for miners and residents in surrounding communities (Crawford & Botchwey, 2021). In addition, the lack of regulation in galamsey compromises Ghana's determination in implementing sustainable mining as captured in the Minerals and Mining Act (Act 703) and global partnerships like the Minamata Convention on Mercury (Government of Ghana, 2006; UNEP, 2013). A three-pronged approach of formalization, strong enforcement, and alternative livelihood programs is needed (Hilson & Maconachie, 2020). Formalizing small-scale mining would bring environmental laws coordination, enhance labor protection, and increase revenue generation (World Bank, 2019). Strengthening observation mechanisms, for instance, by employing satellite tracking and reporting by communities, would help detect illicit behavior (Teschner, 2022). Investment in vocational skills and entrepreneurship on farms would generate practical economic opportunities for the impacted youth (Banchirigah, 2021). Through a comprehensive approach, Ghana can legalize, make sustainable, and economically include the small-scale mining sector, harmonizing the world's best practices in a manner that protects the environment and livelihoods. Therefore, the purpose of this study is to critically examine the intricate causes and consequences of illegal small-scale mining in Ghana and evaluate the effectiveness of formalization as a long-term policy response. The research employs a comparative policy analysis of formalization programs that have proven effective in other African countries to develop a customized framework suitable for Ghana. The research uses a comparative policy analysis of formalization programs that have been found effective in other African countries to establish an adapted framework suitable for Ghana. This study is distinctive because it adopts a multifaceted approach that hasn't been combined in prior research: licensing mechanisms, satellite-based monitoring, and cooperative-based financial models. Also, the study provides a structured, evidence-based implementation strategy that makes a significant scientific contribution.

2 The Challenges of Galamsey

Illicit small-scale mining, also known as "galamsey," has had severe negative impacts on Ghana's environmental, economic, and social settings, especially in mining towns like Obuasi, Tarkwa, and Prestea. However, one of the most severe negative impacts on the environment is water pollution. This is due to the use of mercury in gold mining that eventually affects water sources like the Ankobra, Pra, and Offin Rivers (Bempah & Ewusi, 2022). More than 60% of mining sites' waters also hold indicators of pollution that have deteriorated the aquatic environment as well as the quality of freshwater sources

(Mantey et al., 2020). Moreover, land depletion worsens this negative phenomenon. In problem sites like the Amansie West District and Adansi North, only 30% of land is not accessed due to land utilization in small-scale mining activities (Hilson & Garforth, 2022). This eventually impacts agricultural productivity in those areas, making people's livelihoods and food security a growing concern (Nyame & Grant, 2021). As indicated in Figure 1, galamsey activities along riverbank forests demonstrate negative impacts on riverbanks and adjacent woodland areas. This results in soil erosion, sedimentation of water sources, and habitat loss for riparian vegetation, leading to the decline of both aquatic and terrestrial ecosystems.

So far, galamsey activities in Ghana have increased land dispute conflicts, especially in the Dunkwa-on-Offin and Manso Nkwanta areas. There are instances of conflict between underground mining groups and AngloGold Ashanti in the Obuasi region that frequently resulted in tragic skirmishes between 2020 and 2021 (Ghana Police Service, 2021). There is empirical evidence supporting the idea that galamsey activities in Ghana have intensified conflicts in mining sites, leading to the breakdown of social cohesion (Teschner, 2022). Moreover, galamsey activities in these mining sites have contributed to high school dropout rates, particularly in Bibiani and Akwatia, as youth abandon education to engage in mining (Basu et al., 2023). This contributes to the high illiteracy rates in these regions, eventually leading to a poverty cycle (World Bank, 2023).

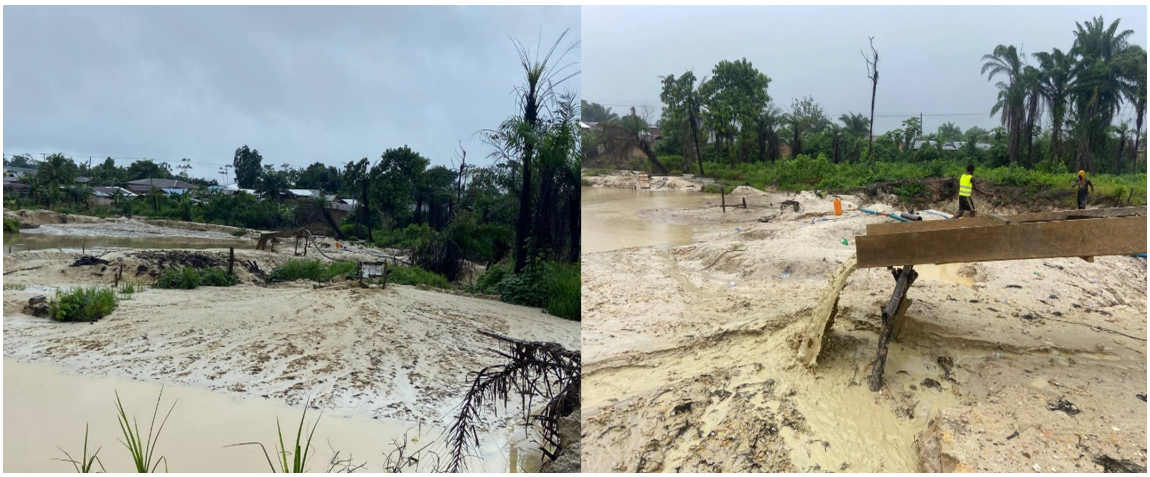

Figure 1: Active galamsey operations in a forested river corridor in Ghana.

3 The Need for Formalization

It is not difficult to see the effects of galamsey on the environment in the river systems of Ghana, as exemplified by the Ankobra River. This river once represented a reliable source of fresh water for various human activities such as domestic use, irrigation, fishing, and sustaining aquatic ecosystems. It is important to note that the Ankobra River is in a much worse state today due to unchecked mining activities that continue to threaten it with high levels of turbidity, sedimentation, and mercury as well as heavy metal pollution. As illustrated in Figure 2, the comparison between the Ankobra River's pre-existing condition and its present polluted state reveals a stark environmental degradation caused by galamsey activities. This contrast underscores the urgent need for regulation—or outright prohibition—of illegal small-scale mining in Ghana.

The efficiency of formalization depends on advanced systems of monitoring and governance. Satellite monitoring schemes spearheaded by the Ghana Space Science & Technology Institute (GSSTI, 2023) as well as blockchain-based traceability systems pilot-tested by the Precious Minerals Marketing Company (PMMC, 2023) are practical embodiments of technological solutions in enhancing formalization. Evidence obtained from small-scale mining formalization activities in Tarkwa and Obuasi conducted by the German Development Cooperation (GIZ, 2022) supports the fact that formalized small-scale mining can decrease environmental damage by as much as 70% and raise government revenue from mining by over 300% within three years. It is imperative to recognize that proper formalization of mining activities is not only essential for addressing issues associated with rivers like the Ankobra but also for promoting sustainable benefits in mining communities.

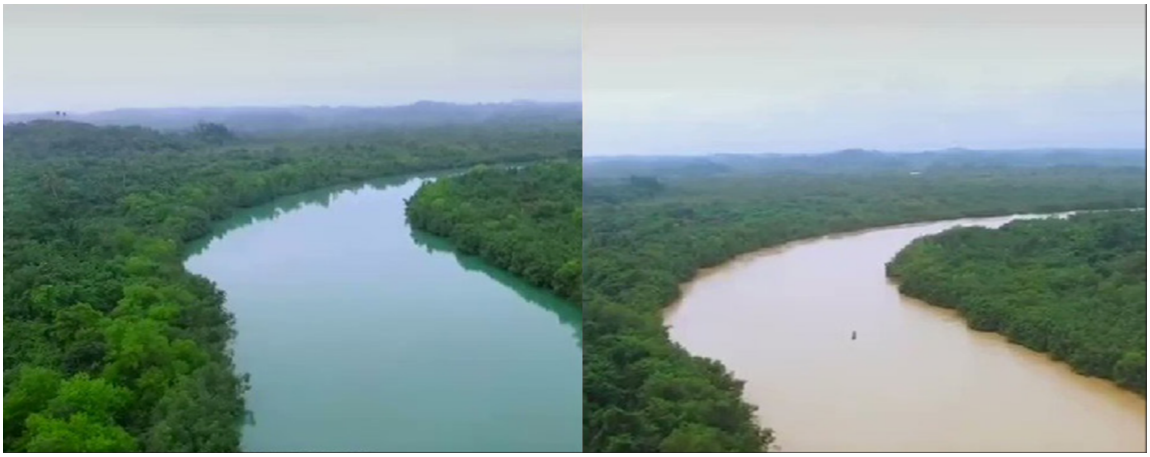

Figure 2: Ankobra River before and after illegal mining contamination.

4 Implementation Strategies

Formalization of the small-scale mining sector in Ghana needs an institutionally based policy intervention that ensures balancing between policy regulation and support mechanisms for the socioeconomic dimensions of the sector. Building on the best international practices and empirical evidence, this paper conceptualizes a multi-dimensional framework for ensuring sustainable formalization. Fundamentally, this involves the implementation of a simplified system of licenses whose function is to minimize bureaucratic obstacles for entry. As experience in the mining sector reforms in Tanzania has shown, digitalization of the system can significantly enhance compliance levels as it curbs processing costs in addition to cutting processing timelines (World Bank, 2022). Mobile technology can be used in combination with other incentive systems that are used under the formalization agenda in Ghana. According to research conducted by the International Institute for Environment and Development, procedural simplification can boost formalization take up rates between 40-60% in similar context (IIED, 2021). Organization of artisan miners into legally formalized cooperatives is an effective institutional response for formalization. Experience in Burkina Faso is that cooperatives increase compliance with the laws as far as they increase access to capital as well as technical aid (Hilson et al., 2023). Collective structures ease specialized aid and generation of economy of scale for tiny operators. German Cooperation experience in Tanzania is further evidence of the role played by cooperatives as effective channels for dissemination of better prac-

tices as well as improvement in standards of operations (GIZ, 2022). An integral part of formalization is sustainable development, and capacity building is the best approach to implement such development. More skills training should cover topics such as stratum management, mineral extraction processes, and foundational entrepreneurship. The University of Mines and Technology has provided evidence that trained miners have significantly higher rates of adoption for sustainable practices, and the benefits persist well after the training has concluded (UMaT, 2023). These training programs need to be supported by certification schemes that acknowledge and provide incentives for meeting the safety and environmental compliance criteria. New technological advancements in the development of institutions need to be applied in enforcement frameworks to enhance innovation and institutional capacity building. Using space related monitoring systems and specialized police units for mining can dramatically improve supervisory functions. Enforcement measures, as proven by OECD's benchmark studies, work best when there are tangible incentives tailored towards rewarding compliance with set guidelines (OECD, 2021). Fostered sanction and reward systems alongside tax rewards and subsidized equipment funding can motivate compliance, formal policy adoption, and provide regulatory thresholds. The formalization process must be accompanied by added services that cater to the wider requirements of mining communities. Access to financing, legal aid on land tenure conflicts, and auxiliary health care services all support formalization efforts. These systems have already been noted as critical by the World Bank's ASM (Artisanal and small-scale mining) formalization toolkit to ease multi-faceted compliance and change in an industry's 'de facto' activities (World Bank, 2023). Adequate local context and institutional capacity need to be tailored for each case for successful implementation. There is a need for learning and adaptation, therefore, starting with pilot regions, followed by a gradual scaling up approach, is recommended. The active inclusion of local governance and customary leadership enhances community capture and buy-in on the results. Robust monitoring and evaluation, integrating both quantitative and qualitative dimensions, offer essential assessment to inform policy improvement. By adding regulatory elements together with developing elements, this comprehensive approach aids in transforming Ghana's artisanal mining sector while grappling with the informality's woes. Aligning this framework with Ghana's pledge to the Africa Mining Vision augments the transformative prospects for reaching multiple sustainable development goals.

5 Benefits of Formalization

Ghana will benefit tremendously in its micro and small-scale mining sector with the introduction of sustainable policies. To bring about change in the informal mining activities, there are indeed valuable policies available in other Sub-Saharan African and South American countries. The transformation of informal mining activities into regulated ones around the world has helped conserve the environment. Controlling mining activities will indeed allow for the healing of ecosystems. The Water Commission is claiming that over 60 percent of water bodies in Ghana are contaminated due to merciless mining activities (Van Deventer,2023). However, that same study shows that small scale legalized mining undergoes mercurial pollution reduction and land degradation of approximately 85 percent and 70% respectively in comparison to corresponding sites (International Institute for Sustainable Development, 2022). Colombia serves as an example where small-scale mining helps economic support while effectively restoring the environment for business

and offering employment opportunities (Sarmiento et al, 2018). GHEITI estimates that unregulated mining costs more than $2.5 billion in lost revenues every year, close to 5% of Ghana's GDP (GHEITI, 2023). Formalization would allow fiscal management in terms of collection on royalties and taxation which, as in Tanzania's formalization initiative, could boost government mining earnings by 350% in five years (World Bank, 2023). Formalization as an element for social development is more important and impactful. The International Labor Organization's study on 15 mining nations discovered that formalized operations decreased on-the-job fatalities by 62% and raised average wages by 40% (ILO, 2023). Locally, Ghana's Community Mining Scheme has tested these advantages, cutting land conflicts by 50% and enhancing working conditions at the pilot sites by 35% (Minerals Commission, 2023). Beyond that, UNICEF documented an increase in school enrolment by 25% from communities moving from informal to formalized mining, showing enhanced learning outcomes (UNICEF Ghana, 2022). Technological advancement is another essential advantage of formalization. The work of the African Minerals Development Center reveals that access to formal finance has 300% higher rates of adoption for technology by small-scale miners (AMDC, 2023). Ecuador's history with the use of leasing programs for equipment reveals 45-60% productivity in formal operations (Hruschka & Echavarría, 2021). Technological tools such as blockchain traceability, which have been used to favorable effect in the mining industry in Rwanda, have enhanced access to markets and raised incomes for miners by 35% (Rwanda Mines Board, 2022). These cross-cutting advantages place formalization of mining in Ghana squarely in line with country support for both the Africa Mining Vision as well as the Sustainable Development Goals. Success for this programme will rest on many factors in implementation that require attention as we look towards the future.

6 Conclusion

Regulation of Ghana's small-scale mining subsector is challenging but an exciting path to sustainable development. By learning from experiences in other Global South countries, we can see that relevant intervention in terms of policy can effectively synchronize environmental protection with economic progress and social welfare. Formal mining has been seen to minimize environmental degradation to measurable levels in such areas as mercury pollution and land destruction (Veiga et al., 2021). Ghana's Community Mining Scheme supports this by showing improvement on measurable levels in land restoration and water purity (Minerals Commission, 2023). Judging from an economic lens, formalization improves transparency, government revenues, and heightens the level of income for miners by improving their access to fair and respectable markets (AMDC, 2022). Such gains also spill over to local economies, improving small businesses and service sectors (Hilson & Maconachie, 2022). Socially, formal operations mean safer working environments, enhanced labor protection, and enhanced social relations with local communities. ILO data point to enhanced working standards and reduced conflict in regulated settings (ILO, 2022). Ghanaian pilots report similar outcomes, with considerably enhanced welfare for workers (Crawford & Botchwey, 2021). Operationalizing this is dependent on some very crucial success factors such as strong monitoring systems that combine modern technology with local acceptance (World Bank, 2022), access to funds for the upgrading of equipment (IGF, 2023), and in-depth training courses for helping adjustment to formal practices (UMaT, 2023). Good governance needs to strike a balance between central control and local discretion to instill confidence as well as uniform implementation (OECD, 2021; Osei-Kojo & Andrews, 2022). Success will depend on Ghana having not only political will, but also stable funds as well as active support from all stakeholders (World Bank, 2023; UNEP, 2023). Ghana has the potential to design an eco-protective formalization approach that is friendly to local communities and makes meaningful contributions to both the Africa Mining Vision as well as the Sustainable Development Goals if addressed accurately.

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