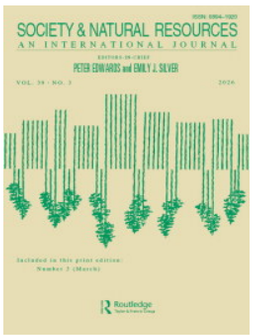

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From Gold to Lithium: Tracing Ghana's Mining Trajectories Through a Historical Political Ecology Lens

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ABSTRACT

This article offers a historical political ecology analysis of Ghana's mining sector, tracing its development trajectories, key actors, environmental impacts, and state interventions. Although previous studies have examined the economic, policy, and ecological dimensions of mining, much of it remains temporally fragmented, offering limited insight into long-term trends. This study bridges that gap by situating current challenges within a broader historical context to inform sustainable policy pathways, particularly as Ghana moves into critical mineral extraction. Drawing on secondary sources, this article highlights how neoliberal reforms since the 1980s have shaped Ghana's mining policies, with significant environmental implications. The findings reveal how ecological concerns were largely neglected until degradation reached critical levels, prompting reactive and often inadequate policy interventions. As Ghana's mining frontier expands to include strategic resources like lithium and graphite, this article calls for historically informed, ecologically sensitive policy frameworks to prevent the repetition of past environmental and social injustices.

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Critical minerals; environmental impacts; historical political ecology; mining; mining policy

Introduction

Ghana is endowed with a rich array of natural resources, including gold, manganese, diamonds, bauxite, limestone, and crude oil. These resources play a central role in shaping the country's economic development, with the mining sector serving as a key driver of growth (Amlannu and Njoku 2024; Gold Board 2025a). Among these, gold has been particularly significant, underpinning Ghana's identity as one of the oldest mining economies in sub-Saharan Africa. The country's historical association with gold earned it the colonial name "Gold Coast," a testament to the abundance of gold deposits that attracted European traders and settlers as early as the 15th century (Hilson 2002; Ofosu-Mensah 2011, 2016).

In recent years, Ghana's mineral landscape has evolved with the discovery of critical minerals such as graphite and lithium (Boafo et al. 2024; Castle Minerals Limited 2025; Dogbevi 2022; International Trade Administration 2023), resources that are

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essential to the development of green technologies and the global transition toward sustainable energy systems (European Commission 2023; Hammond and Brady 2022). These developments have the potential to reposition Ghana as a strategic actor in the global energy transition, while simultaneously introducing new challenges and opportunities within its mining sector. Given the historical trajectory of gold mining in Ghana, marked by ecological degradation, weak regulatory enforcement, and the proliferation of illegal small-scale mining (Barenblitt et al. 2021; Hilson 2017; Hilson and Potter 2003; Obodai, Bhagwat, and Mohan 2024; Teschner 2012), it is imperative that the country avoids repeating past mistakes. Charting a sustainable path forward will require the implementation of robust institutional frameworks, proactive environmental safeguards, and inclusive governance mechanisms that prioritize ecological integrity alongside economic development. Thus, a historical account of Ghana's mining sector, as presented in this paper, is essential for illuminating the systemic shortcomings that have shaped its development. By tracing the sector's evolution across different political and economic regimes, this analysis underscores the importance of historical context in informing more sustainable and equitable mining governance moving forward.

The structure of Ghana's mining industry reflects a dualistic pattern common across many African economies, comprising both large-scale industrial operations and a rapidly expanding small-scale and artisanal mining subsector (Forkuor, Ullmann, and Griesbeck 2020; Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development 2017; Ofosu et al. 2025; World Bank 2020). Over the past few decades, the sector has undergone significant policy and regulatory reforms aimed at improving governance, enhancing transparency, and maximizing developmental outcomes. Despite these efforts, the environmental consequences of mining, particularly those associated with informal small-scale operations have become increasingly severe (Bansah, Acquah, and Boafo 2024; Barenblitt et al. 2021; Obodai, Bhagwat, and Mohan 2024; Siaw, Ofosu, and Sarpong 2023). Issues such as deforestation, water pollution, and land degradation have provoked widespread public concern from a broad coalition of stakeholders including environmental activists, trade unions, non-governmental organizations, opposition political parties, and international bodies (Darko 2024; Osei-Mensah 2024; Reuters 2024; Yiadom 2024). These actors have collectively demanded decisive governmental action, ranging from the declaration of environmental emergencies and the prosecution of both individual and corporate offenders to the revocation of permits associated with environmentally destructive operations These developments underline the urgent need for more sustainable and accountable mining practices in Ghana.

While a substantial body of literature has examined the economic, policy and ecological dimensions of Ghana's mining sector, much of it remains temporally fragmented, offering limited insight into long-term trends. This study bridges that gap by situating current challenges within a broader historical context to inform sustainable policy pathways, particularly as Ghana moves into critical mineral extraction. By drawing extensively on relevant secondary sources and situating contemporary developments within a broader historical and political ecological context, this study aims to contribute to a more nuanced understanding of the sector's developmental trajectory and its associated ecological footprint. Specifically, this study aims to critically and historically trace the evolution of Ghana's mining sector, with particular emphasis on policy development and state interventions from the precolonial period to the present, an

area that remains underexplored in existing literature. Furthermore, the study aims to interrogate the shifting power dynamics among key actors within the sector over time, highlighting how these relationships have evolved alongside broader structural changes. Lastly, the study critically assesses the ecological consequences of successive policy reforms and evolving power relations, adopting a historical lens to illuminate the long-term environmental implications of mining governance in Ghana.

This research builds upon the foundational contributions of Hilson (2002), Aryee, Ntibery, and Atorkui (2003), and Bebbington et al. (2018). Hilson (2002) provides a comprehensive historical and analytical overview of gold mining in Ghana, tracing its evolution from pre-colonial artisanal practices through colonial industrialization to the modern era of large-scale and small-scale operations. The study highlights the limited success of regulatory frameworks in mitigating environmental degradation and ensuring equitable benefit distribution, advocating for more inclusive and sustainable mining policies. Aryee, Ntibery, and Atorkui (2003) offer a focused examination of the environmental implications of small-scale mining (SSM), emphasizing its socio-economic importance while documenting significant ecological challenges such as land degradation, deforestation, and water pollution. The authors identify weak regulatory enforcement, limited technical capacity, and economic pressures as key drivers of these impacts. Bebbington et al. (2018) periodise the development of Ghana's mining sector from the pre-colonial era to 2016, analyzing major policy frameworks, dominant actors, and efforts to promote industrial inclusivity. This current study extends their timeline to incorporate recent regulatory developments and introduces a critical ecological dimension by systematically examining the environmental footprints of mining activities across historical periods, an area previously underexplored in the literature. The following section elaborates on historical political ecology, the theoretical framework underpinning this study.

A Political Ecology Approach

The origins of political ecology can be traced to the 1980s, with foundational contributions from scholars such as Watts 1983), Blaikie (1985), and Blaikie and Brookfield (1987). These early works were shaped by diverse intellectual traditions, notably the environmental movements of the 1960s and 1970s, which emphasized concerns such as overpopulation and the depletion of finite natural resources (Bridge, McCarthy, and Perreault 2020; Watts 2020). Despite its widespread application, political ecology remains a conceptually fluid field. It has been variously described as a theoretical framework, a social movement (e.g., the green movement), and an intersection of ecological and political-economic concerns (Atkinson 1991; Blaikie and Brookfield 1987). This study adopts Robbins (2019) definition of political ecology as a "community of practice united around a certain kind of text." Broadly, political ecology investigates the dynamics of social and environmental systems, with a particular focus on the power relations that shape these interactions. Political ecologists argue that human-environment relationships are inherently systemic, such that disruptions in one component reverberate throughout the entire system (Bryant and Bailey 1997). While environmental change affects all actors within a system, political ecologists contend that the distribution of its costs and benefits is often unequal. These disparities frequently reinforce or exacerbate existing social and economic inequalities, with significant political implications.

Consequently, the impact of power asymmetries on environmental health and sustainable livelihoods constitutes a central concern within political ecology.

Historical analysis has long been integral to political ecology, as evidenced by the extensive use of historical methodologies in both theoretical and empirical studies (Blaikie 1985; Blaikie and Brookfield 1987; Bryant and Bailey 1997; Robbins 2019; Watts 1983). In recent years, scholars have increasingly sought to establish historical political ecology as a distinct subfield (Davis 2009; Hecht 2013; Offen 2004). Offen (2004, 21) defines historical political ecology as an interpretive approach that examines past society-nature relationships, the spatial and temporal transformations of these relationships, and the implications of such interpretations for contemporary efforts in social justice and environmental conservation. While historical context is essential, some scholars argue that it is insufficient on its own. Davis, Perreault, and Bridge (2020, 263) asserts that historical analysis is necessary to avoid apolitical interpretations but must be complemented by a critical understanding of landscape development, social interactions, and the epistemological privileges embedded within them. Integrating ecological and political-economic histories enables a more comprehensive understanding of the long-term societal and environmental consequences of specific phenomena.

Political ecologists frequently turn to historical inquiry to contextualize present-day issues. A seminal example is Michael Watts (1983) *Silence Violence*, which examines famine in Nigeria from the early 1600s to the late 1970s. Watts demonstrates that the roots and contemporary manifestations of marginalization and famine are comprehensible only through an understanding of the historical entanglement of African peasants in global capitalist dynamics, both during and after colonialism. His work distinguishes between apolitical explanations of drought and famine and the "silent violence" of historically contingent shifts in political economy and social relations, which replaced moral economies with market economies at considerable social and environmental cost. Such nuanced insights are attainable only through rigorous historical analysis combined with contemporary fieldwork (Watts 1983). The literature in political ecology is diverse and interdisciplinary, encompassing subfields such as historical ecology, land-use and land-cover change, colonial legacies, resource conflicts, and geohistorical revisionism (Offen 2004). In this paper a historical political ecology approach is adopted to examine Ghana's mining sector, focusing on how political and economic forces have shaped ecological outcomes over time.

Nature, Society, and the Politics of Mining in Ghana: A Historical Political Ecological Perspective

Ghana has a longstanding and complex history of mineral extraction, particularly gold mining. Between 1493 and 1600, the country accounted for an estimated 36% of global gold output, producing approximately 8,153,426 fine ounces (Government of Ghana 2014, 4). In contemporary times, Ghana has emerged as the leading gold producer on the African continent and ranks sixth globally (World Gold Council 2025). This position, however, is the outcome of a historically uneven trajectory. The evolution of mining governance and practice can be traced through the pre-colonial, colonial, and post-independence periods, each characterized by distinct institutional arrangements and associated ecological consequences (Table 1).

Table 1. Historical political ecology of Ghana's mining sector: actors; ecological footprints and reforms/actions.

Period	Dominant actors	Ecological Footprints[2]	Key Policy Reforms and actions
Pre-colonial Era	Chiefs, clans, and families	Minimal ecological footprints	
1874 – 56	British mining companies, chiefs	Emerging ecological footprints.	• 1897 Land Bill • Mercury Ordinance Law of 1933
1957 – 85	State	Intensifying ecological footprints	• Minerals Act (Act 123) of 1962
1986 – 08	Multinational corporations, IMF, and World Bank	Intensification of ecological footprint	• Minerals and Mining Law (PNDC Law 153 of 1986) • Mercury Act (PNDC Law 217 of 1989) • Small-Scale Mining Law in PNDC Law (218 of 1989) • Precious Minerals Marketing Corporation ACT (PNDC Law 219 of 1989) • Government of Ghana, (1994) (Act 490) • Minerals and Mining Act (Amendment), 2006 (Act 703).
2009 –15	Multinational corporations, Chiefs, Small-Scale miners, foreign nationals – Chinese	Escalating ecological footprints driven by illegal small-scale mining	

2016 – 25	Multinational corporations, State, Small-Scale miners; Foreign nationals – Chinese	Intermittent reductions and hikes in ecological footprints	• Government of Ghana, (2016) (Act 912).
			• Minerals and Mining (Amendment) Act, 2019 (Act 995)
			• Inter-Ministerial Committee on Illegal Mining
			  • Operation Vanguard
			  • Operation Halt
			  • Operation Quick Response
			• Community Mining Scheme
			• Mining Cooperatives (proposed)
			• Gold Board Act, 2025 (Act 1140)

Traditional Governance and Minimal Ecological Footprints (Pre-Colonial Era)

In pre-colonial Ghana, the regulation and management of mineral resources were primarily under the jurisdiction of traditional authorities. Chiefs and kings exercised control over mineral-rich lands, allocating access and overseeing mining activities for the collective benefit of their communities (Dumett 1998). The exercise of this authority varied according to hierarchical status and was operationalized through several mechanisms. The most widespread system in southern Ghana was the '*abusa*' share arrangement, wherein miners were required to divide their earnings into three equal parts: one-third was allocated to the local chief or stool, another third to the paramount chief or king, and the remaining third was retained by the miner (Dumett 1998; Ofosu-Mensah 2016). A second mechanism involved the imposition of direct taxes, justified by the chiefs' customary authority and the kinship obligations of their subjects. A third method entailed compulsory communal labor, whereby community members were periodically required to mine on behalf of the paramount chief (Dumett 1998). Traditional rulers wielded considerable power and could, at times, extract gold dust and ornaments from miners and their families outside the formalized systems of taxation or profit-sharing (Dumett 1998, 75–76). Mining during this period was largely

artisanal and seasonal, conducted by farmer-miners and their families as a supplementary livelihood strategy (Ofosu-Mensah 2011, 2016). The predominant techniques included alluvial mining, shallow pit mining, and deep shaft mining, with alluvial methods being the most common, particularly along the banks of rivers such as the Ankobra, Tano, Birim, and Offin (Dumett 1998). Due to the rudimentary nature of the tools and techniques employed, mining activities during the pre-colonial era had negligible ecological impact. Consequently, there was little need for formal environmental regulation, as the scale and intensity of operations did not pose significant threats to the natural environment.

Colonial Capitalism, the Decline of Traditional Authority, and Emerging Ecological Footprints (1874–1956)

The establishment of British colonial rule in 1874 marked a decisive transformation in Ghana's mining sector. Colonial capitalism facilitated the commodification of mineral-rich lands and progressively eroded the authority of traditional rulers over land and mineral resources (Bebbington et al. 2018; Ofosu-Mensah 2011). Growing European interest in the Gold Coast's mineral wealth led to intense competition for mining concessions in the 1880s, prompting the colonial administration to introduce the 1897 Land Bill to regulate land acquisition and mineral rights (Ofosu-Mensah 2011). This period coincided with a major influx of foreign capital, exemplified by the 25,000-hectare Obuasi concession granted in 1890 and the completion of the Takoradi–Kumasi railway in 1901(Hilson 2002). These developments triggered the first major gold rush, known as the "first Jungle Boom," during which over 400 companies invested approximately £40 million in gold mining ventures (Hilson 2002; Kesse 1985). The Boer War (1899–1902) further accelerated investment flows, resulting in a 400% increase in gold production between 1901 and 1902 (Hilson 2002). A second surge in mining activity followed the First World War, with up to 7,000 concession applications recorded during the "second Jungle Boom" (Hilson 2002). These gold rushes commercialized stool lands, disrupted customary tenure systems, and generated widespread inter-village boundary disputes (Ofosu-Mensah 2016). While some chiefs benefited financially from leasing mineral rights, many lost effective controls over land and labor as the colonial state, allied with European mining companies, became the dominant authority in the sector (Dumett 1998).

The colonial era also marked the emergence of mining-related ecological footprints. As European firms expanded operations, some indigenous miners left wage employment to establish independent ventures, combining traditional practices with European techniques such as mercury and cyanide use. This hybrid approach laid the foundation for what later became known as small-scale or "galamsey" mining (Ofosu-Mensah 2010). The widespread use of mercury, however, posed significant environmental and public health risks. Its accessibility, coupled with limited regulatory oversight, resulted in soil contamination and water pollution in mining areas (Addy 1998; Ofosu-Mensah 2011).

Despite growing environmental concerns, these impacts were largely ignored due to their localized nature and limited perceived systemic risk. In response, the colonial government enacted the 1933 Mercury Ordinance, which prohibited indigenous miners

from using mercury. While framed as environmental regulation, the ordinance effectively criminalized small-scale mining, further marginalized indigenous producers, and weakened chiefly authority over land and labor (Akabzaa and Darimani 2001; Ofosu-Mensah 2011; Tsuma 2010). Mercury use nevertheless persisted through clandestine markets, often sustained by political elites and influential actors involved in the illegal trade (Ofosu-Mensah 2011). This entanglement of political power, informal mining, and environmental harm entrenched ecological degradation while deepening the erosion of traditional governance structures.

Post-Independence Reforms, Nationalization and Intensifying Ecological Footprints (1957 to 1985)

Following Ghana's independence in 1957, the government introduced reforms to restructure the mining sector in line with national development priorities. In 1958, a Commission was established to review mineral rights, mining profitability, and the status of unexplored concessions (Tsikata 1997). Its recommendations marked a clear break from colonial policies, proposing the transfer of mineral rights from traditional authorities to the state, revised royalty calculations based on net profits, and the allocation of royalty shares to landowners. The Commission also called for stricter regulation of mineral concessions, including the revocation of inactive rights, increased state participation through a 51% ownership stake in mining companies, and the possible establishment of a state monopoly over mineral exports (Boateng 1961, cited in Tsikata 1997). These recommendations led to the establishment of the State Gold Mining Corporation (SGMC) in 1961. By 1966, SGMC had taken control of most gold mines previously operated by British firms, except for the Obuasi mine (Hilson 2002). Nationalization was formalized through the Minerals Act (Act 123) and the Concessions Act (Act 124) of 1962, which vested all mineral resources in the President on behalf of the state and required minerals to be sold to designated state agencies. The Administration of Government of Ghana (1962) further centralized control by transferring the management of stool lands from chiefs to the state, with compensation administered by government authorities (Tsikata 1997). Despite these reforms, the mining sector's economic performance declined sharply, with its contribution to GDP falling from 2.5% in 1968 to 0.3% in 1982 (Addy 1998). This decline prompted the adoption of the Economic Recovery Programme (ERP) in 1983, supported by the World Bank and IMF, which initiated liberalization and reconfigured state involvement in mining. Although formal state control persisted, small-scale and informal mining expanded during this period. These largely unregulated activities intensified ecological degradation through mercury use, land clearance, and water pollution, impacts that remained largely overlooked due to weak monitoring and their localized nature.

Liberalization of the Mining Sector and Intensification of Ecological Footprints (1986–2008)

The liberalization of Ghana's mining sector began in 1986 under the Structural Adjustment Programme (SAP), implemented as part of the broader Economic Recovery Programme. SAPs, promoted by international financial institutions, sought to restructure

national economies along neoliberal lines, emphasizing market liberalization, privatization, and reduced state intervention (Mohan and Chiyemura 2020). In Ghana, these reforms fundamentally reconfigured the mining sector by promoting foreign investment and diminishing direct state control. Akabzaa and Darimani (2001) identify five key SAP-induced reforms: legislative changes to attract foreign capital, fiscal liberalization, privatization of state-owned enterprises, the introduction of environmental legislation, and institutional strengthening. These reforms were consolidated through major legal instruments, including the Minerals and Mining Law (PNDCL 153 of 1986), the Small-Scale Mining Law (PNDCL 218 of 1989), and the Mercury Act (PNDCL 217 of 1989). The 1986 law established the Minerals Commission, liberalized the investment regime, and introduced generous tax incentives and capital allowances for multinational firms. As a result, private capital investment in the mining sector reached nearly US$4 billion between 1983 and 1998, funding exploration, mine development, and rehabilitation (Aryee 2001; Government of Ghana 2014).

A significant structural shift accompanied liberalization, with large-scale operators increasingly adopting surface mining techniques. This transition required extensive land acquisition, often displacing small-scale miners and generating conflicts over access to land and concession boundaries (Ofosu and Arthur-Holmes 2025; Yankson and Gough 2019). Liberalization was further reinforced by the (Government of Ghana, 2006) (Act 703), which reduced corporate tax rates and eliminated additional profit taxes to attract multinational investment (Bebbington et al. 2018). Attempts to introduce windfall taxes during commodity booms were largely unsuccessful, limiting the state's ability to capture excess rents.

To regulate the expanding small-scale mining sector, the Small-Scale Mining Law of 1989 legalized mining by Ghanaian citizens and introduced licensing arrangements for individuals, groups, and cooperatives. However, the law failed to clearly distinguish between artisanal and small-scale mining or to designate specific zones for different mining activities. This regulatory ambiguity, unlike approaches adopted in countries such as Burkina Faso, Peru, and Tanzania, has been widely cited as a governance challenge (UNDP Ghana 2017; UNEP 2012). Ongoing legislative reforms seek to address this gap, including proposals to introduce a medium-scale mining category.

Although the Mercury Act repealed colonial-era restrictions on mercury use, regulation of mercury in small-scale mining has remained ineffective (Nyame 2010; Ofosu-Mensah 2011). Despite Ghana's ratification of the Minamata Convention, mercury continues to be widely used in gold extraction. The Ministry of Environment, Science, Technology and Innovation (2018) estimates that gold mining accounts for 56% of the 81,060 kg of mercury released annually into the environment. Mercury contamination of water, air, and soil frequently exceeds international thresholds, with documented adverse effects on ecosystems and human health (Amonoo-Neizer, Nyamah, and Bakiamoh 1996; Clifford 2017; Golow and Adzei 2002; Golow and Mingle 2003; Gyamfi et al. 2021; Ye et al. 2016). At the same time, the establishment of the Precious Minerals Marketing Corporation (PMMC) created a formal market for small-scale miners, enabling licensed agents to purchase gold directly and reducing exploitation by intermediaries (Government of Ghana 2014). While this improved market access and transparency, the environmental benefits have been undermined by continued mercury use and weak enforcement.

Environmental degradation intensified during this period despite the establishment of the Environmental Protection Agency (EPA) in the early 1990s. The EPA was mandated to safeguard environmental quality through policy development and regulatory oversight (Akabzaa and Yidana 2011; Akabzaa, Banoeng-Yakubo, and Seyire 2009; Akabzaa and Darimani 2001; Hilson 2004). However, the rapid expansion of legal and illegal small-scale mining overwhelmed regulatory capacity. Documented impacts include widespread water pollution, deforestation, encroachment into forest reserves, biodiversity loss, and the degradation of arable land in mining communities (Adator et al. 2023; Awotwi et al. 2018; Bansah, Acquah, and Boafo 2024; Barenblitt et al. 2021; Boadi et al. 2016; Boakye et al. 2020; Forkuor, Ullmann, and Griesbeck 2020; Nyamekye et al. 2021; Obodai, Bhagwat, and Mohan 2024, Obodai et al. 2019; Siaw, Ofosu, and Sarpong 2023).

Weak enforcement of environmental regulations has been attributed to systemic institutional failures. A Ghana Audit Service (2021) report, identified major lapses in oversight by both the EPA and the Minerals Commission, including failures to enforce reclamation bonds, monitor restored sites, and ensure compliance with approved land rehabilitation plans. These shortcomings reflect broader governance challenges within the extractive sector. Stapenhurst et al. (2017) document entrenched, multi-layered corruption involving mining companies and regulatory institutions, enabling widespread noncompliance in both formal and informal small-scale mining. Additional constraints include limited community participation, poor inter-agency coordination, inadequate resources, and weak political commitment to enforcement (Tuokuu et al. 2018). Collectively, these factors have exacerbated ecological degradation and undermined public confidence in mining governance during the liberalization era.

Increasing State Interest and Escalating Ecological Footprints (2009–2015)

The period from 2009 to 2015 marked a renewed phase of state interest in Ghana's mining sector, echoing post-independence efforts to maximize national benefits from mineral extraction (Bebbington et al. 2018). Unlike earlier nationalization strategies, this phase focused on fiscal reforms designed to increase state revenue while retaining private sector participation. Key measures included the introduction of the National Fiscal Stabilization Levy in 2009, which imposed a 5% levy on pretax profits in the mining sector, and amendments to the Minerals and Mining Act, 2006 (Act 703) through Act 794 in 2010, which replaced a variable royalty rate with a uniform 5%. In 2012, the corporate income tax rate for mining companies was increased from 25% to 35% (Bebbington et al. 2018). These reforms significantly increased government revenue from mining. By 2020, mining and quarrying had become Ghana's largest contributor to domestic revenue, generating GH₵4.172 billion (Ghana Chamber of Mines 2021). Rising global gold prices further boosted royalties, which increased by 38.2% between 2019 and 2020. Despite these gains, revenue distribution remained highly unequal. Only about 13% of royalties were allocated to mining-affected communities, with limited transfers to District Assemblies, the Mining Community Development Scheme, and traditional authorities. Evidence suggests that funds channeled through traditional councils are often diverted away from community development, resulting in minimal improvements in local livelihoods and infrastructure (ICMM,

2007 cited in Bebbington et al. 2018). This persistent inequity has contributed to the expansion of galamsey, frequently involving local youth and sub-chiefs, and associated environmental degradation.

Regulatory reforms during this period sought to address the rapid expansion of small-scale mining. The Minerals and Mining (Amendment) Act, 2015 (Act 900) introduced stricter penalties for illegal mining, including equipment confiscation, higher fines, and longer prison sentences, particularly for foreign nationals. These measures reflected growing state concern over the sector's environmental and economic impacts. However, enforcement remained weak due to limited institutional capacity, corruption, and political interference (Abdulai 2017; Boafo, Paalo, and Dotsey 2019; Crawford and Botchwey 2017). Consequently, both legal and illegal small-scale mining continued to operate with minimal oversight.

Ecological degradation intensified during this period. The expansion of small-scale mining accelerated deforestation, land degradation, and the pollution of rivers and streams (Bansah, Acquah, and Boafo 2024; Barenblitt et al. 2021; Forkuor, Ullmann, and Griesbeck 2020; Obodai, Bhagwat, and Mohan 2024, Obodai et al. 2019), often overwhelming the regulatory capacity of institutions such as the EPA, Forestry Commission and Water Resources Commission.

Following the 2008 global financial crisis, international gold prices rose sharply, triggering a global expansion in small-scale gold mining (see Figure 1). Ghana was particularly affected, experiencing a substantial influx of foreign nationals, predominantly Chinese, into its small-scale mining sector (Antwi-Boateng and Akudugu 2020; Kumah 2023). Mining practices shifted from labor-intensive methods using basic tools to mechanized operations involving excavators and suction dredges. This technological transformation, driven largely by foreign capital and expertise, significantly increased production efficiency and the scale of operations (Crawford and Botchwey 2017).

By 2018, small-scale mining accounted for approximately 43% of Ghana's total gold output, underscoring its growing economic significance (Minerals Commission 2019, cited in Adu-Baffour, Daum, and Birner (2021). However, these gains have come at a high environmental cost. Evidence suggests that the cumulative ecological footprint of

Figure 1. World gold price (US$/troy ounce), 2000 to 2025.
Source: World Gold Council 2025

small-scale mining may exceed that of large-scale industrial mining, particularly in terms of deforestation, soil degradation, and water pollution (Barenblitt et al. 2021). This period therefore highlights the deepening tension between revenue mobilization, livelihoods, and environmental sustainability, underscoring the urgent need for more effective regulation and environmentally responsible mining practices.

Renewed State Commitments, Intermittent Reductions and Hikes in Ecological Footprints (2016 – Present)

From 2016 onward, Ghana experienced renewed state commitment to addressing the environmental degradation associated with artisanal and small-scale gold mining. Heightened pressure from civil society organizations, affected communities, the media, and environmental advocates prompted a series of regulatory and institutional interventions aimed at curbing illegal mining and its ecological impacts. These efforts, however, have been uneven, producing intermittent reductions and renewed escalations in environmental harm.

One of the earliest responses was the amendment of the Minerals and Mining Act, 2006 (Act 703), to impose harsher penalties for unauthorized mining and the illegal sale or purchase of minerals. The amendment also prohibited foreign nationals and companies from providing mining support services to small-scale operators, reinforcing the sector's legal reservation for Ghanaian citizens. A major institutional intervention followed with the establishment of the Inter-Ministerial Committee on Illegal Mining (IMCIM),[1] mandated to oversee a temporary nationwide ban on small-scale mining. To enforce the ban, the IMCIM launched Operation Vanguard, a joint military–police task force that conducted arrests and confiscated heavy machinery, including excavators and dredging equipment. Complementary measures included a moratorium on the importation of excavators, introduced on 1 May 2019. Although these interventions initially yielded some environmental improvements, such as reported reductions in turbidity in rivers like the Ankobra (Statesman 2023), they were undermined by serious governance challenges. Allegations of corruption, missing confiscated equipment, and bribery involving task force members eroded public confidence in the IMCIM. In his 2020 State of the Nation Address, the President acknowledged the persistence of the environmental crisis and called for an "open and honest conversation" on the future of small-scale mining. In January 2021, the IMCIM was dissolved. Subsequently, the government convened the first National Consultative Dialogue on Small-Scale Mining in April 2021. This dialogue brought together stakeholders nationwide and culminated in a declaration recognizing galamsey as a threat to water security and environmental sustainability, calling for coordinated national action (Ministry of Lands and Natural Resources 2021). Shortly thereafter, a new military-led task force, Operation Halt, was launched. Its enforcement strategy, including the destruction of mining equipment, attracted significant public debate. By May 2021, Operation Halt had destroyed dozens of excavators, floating dredges, and water pumps (Graphic Online 2021). While controversial, these actions signaled a more forceful stance against illegal mining and its environmental consequences.

Additional regulatory measures focused on spatial exclusion. Wetlands, forest reserves, and water bodies were designated as "red zones" where mining activities were strictly

prohibited. The Ministry of Lands and Natural Resources suspended reconnaissance and prospecting activities in forest reserves, and the Minerals Commission was instructed to halt the issuance and renewal of related licenses. These directives were issued under Section 4 of the Minerals and Mining Act, 2006 (Act 703), which empowers the Minister to reserve land from mining. While long overdue, these interventions reflected growing recognition of the ecological value of Ghana's forest and aquatic ecosystems. Nevertheless, illegal mining persisted in many protected areas, limiting the overall reduction in ecological footprints.

To address the structural drivers of illegal mining, the government introduced the Community Mining Scheme (CMS), conceived as a mechanism to formalize small-scale mining through structured community participation. Initially presented as a sustainable alternative to unregulated mining, the CMS lacked operational clarity until the publication of an official implementation manual by the Minerals Commission in September 2021. The manual outlined the scheme's objectives, eligibility criteria, administrative structures, oversight committees, and licensing procedures (Minerals Commission of Ghana 2021). The government designated 328 concessions across 16 mining districts for implementation (MESTI 2020). According to official statements, the CMS aimed to formalize mining activities, provide technical training, and ensure more equitable distribution of mining revenues (Ibid). Despite these ambitions, the CMS attracted significant criticism. Scholars noted its limited inclusivity, particularly its failure to adequately integrate key actors within the ASM sector (Ofosu and Arthur-Holmes 2025). Although oversight mechanisms were introduced, the roles and responsibilities of stakeholders were insufficiently defined, weakening accountability (ibid). Empirical studies nonetheless highlighted the scheme's potential to transform ASM governance. Some researchers argued that the CMS could foster more inclusive regulation by integrating local government units and expanding access to mineralized land for educated youth, while challenging the dominance of large-scale mining interests and promoting sustainable practices (Arthur-Holmes et al. 2022a, 2022b; Hilson, Bartels, and Hu 2022; Vazquez-Brust, Arthur-Holmes, and Yakovleva 2024). Other studies, however, identified serious shortcomings. Aram et al. (2024) argued that the CMS did not adequately address occupational health and safety risks, particularly those associated with informal underground mining. The Ghana Medical Association dismissed the scheme as a superficial reform, alleging that it enabled the continuation of illegal mining under a formal label (Modern Ghana 2024). These critiques gained political traction following the 2024 change in government. In March 2025, the CMS was officially discontinued, with the new Minister for Lands and Natural Resources asserting that the scheme had failed to deliver tangible community benefits. The government announced plans to replace it with Mining Cooperatives, to be developed through a consultative process involving local communities (Joy Online 2025; Ofosu and Arthur-Holmes 2025).

Alongside these developments, Ghana introduced a major institutional reform with the passage of the Government of Ghana, 2025 (Act 1140), which established a state-controlled entity popularly referred to as the "GoldBod." The Act centralizes the regulation, purchase, and export of gold, aiming to address illicit trading, revenue leakage, and fragmented oversight. Conceptually, the GoldBod represents a strategic attempt to strengthen state authority over gold resources, improve revenue mobilization, and enhance national economic security (Government of Ghana 2025). Since its

operationalization, proponents claim that the GoldBod has improved gold traceability, reduced smuggling, and stimulated production within the artisanal and small-scale mining subsector. The Chamber of Licensed Gold Buyers argue that these outcomes have increased national gold output and reserves, contributing to macroeconomic stability and positioning Ghana as a potential model for gold sector reform in Africa (Gold Board 2025b). However, critical analyses raise constitutional and governance concerns. Some scholars argue that the Act effectively establishes a state monopoly over the gold sector, potentially contravening constitutional provisions on economic justice and competitive enterprise (Barimah 2025). By concentrating regulatory and commercial authority within a single state entity, critics contend that the GoldBod marginalizes private sector actors and artisanal miners while offering limited mechanisms for equitable wealth redistribution.

Given its recent establishment, the long-term effectiveness of the GoldBod remains uncertain. Early successes may reflect short-term enforcement gains rather than substantive structural transformation. Its durability will depend on its ability to dismantle entrenched illicit trading networks, enforce compliance and traceability standards, and avoid replicating the inefficiencies of previous regulatory arrangements. Moreover, a critical unresolved question concerns whether the GoldBod meaningfully contributes to mitigating the severe environmental impacts associated with small-scale mining, from which it sources gold. This question becomes especially pertinent if small-scale mining of critical minerals emerges in Ghana, as has occurred in countries such as the Democratic Republic of Congo, where artisanal extraction has followed large-scale mining operations. The extent to which Ghana's renewed state interventions can reconcile revenue generation, livelihoods, and environmental sustainability therefore remains an open and pressing challenge.

Conclusions

This article provides a historical and ecological analysis of Ghana's mining sector, tracing its transformation from pre-colonial subsistence mining to a capital-intensive industry shaped by colonial and post-colonial political economies. It highlights the shift in power from traditional authorities, once custodians of natural resources, to colonial administrations that institutionalized state control over mineral wealth, a legacy that continues to shape contemporary resource governance. This restructuring intensified socio-political tensions between local communities and corporate entities, contributing to the proliferation of informal small-scale mining activities, commonly referred to as *galamsey*. The widespread use of mercury and other environmentally harmful practices has led to enduring ecological degradation, while state-led responses, including militarized enforcement, have largely failed to yield sustainable outcomes. With the recent discovery of critical minerals, Ghana is at a strategic juncture. To avoid replicating the ecological and governance failures associated with gold extraction, it is imperative that future policy frameworks draw lessons from historical missteps. As evidence in other parts of Africa including Zambia, Zimbabwe, DR Congo, the expansion of critical mineral extraction attracts informal and illegal mining actors (Boafo and Arthur-Holmes 2025), necessitating the implementation of proactive and enforceable regulatory measures. Accordingly, this article advocates for mining policies

that prioritize environmental sustainability, inclusive community engagement, and institutional accountability. As Ghana integrates into global energy transition and green technology supply chains, the establishment of robust governance structures and stringent environmental safeguards will be essential to ensure that mineral exploitation contributes to Ghana's development without compromising ecological integrity or public health.

Notes

1. *The committee was made up of Ministers of the following ministries: Environment, Science, Technology, and Innovation (MESTI), Lands and Natural Resources, Local Government and Rural Development, Chieftaincy and Religious Affairs, Regional Re-Organisation and Development, Monitoring and Evaluation, Water and Sanitation, Interior, Defense, and Information.*
2. *Ecological Footprint (EFP) measures how much nature we have and how much nature we use. This helps countries to improve sustainability and well-being, local leaders to optimise public project investments and individuals to understand their impact on the planet (ibid). In this study, EFP of mining is defined in terms of the activities associated with mining that harms nature. They include forest and land clearing, land and water pollutions and water diversions. These activities trigger three main EFP: deforestation, land degradation, and pollution with varied ramification for nature and humans.*

Author contributions

CRediT: **Jacob Obodai**: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Writing – original draft, Writing – review & editing.

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