The Extractive Industries and Society 16 (2023) 101357

Contents lists available at ScienceDirect

The Extractive Industries and Society

journal homepage: www.elsevier.com/locate/exis

Original article

Beyond legislation: Unpacking land access capability in small-scale mining and its intersections with the agriculture sector in sub-Saharan Africa

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ARTICLE INFO

Keywords:
Small-scale mining
Political ecology
Capability approach
Land access
Politics

ABSTRACT

The complex relationship between mining and agriculture in Africa is deeply rooted in a complex network of spatial, political, and socio-economic dynamics. In Ghana, for instance, the forest agroecological zone, responsible for 57 % of food crop production, coincides with 61 % of mineral-rich areas. This overlap leads to significant implications, such as competition and conflicts over land, as both livelihood activities rely on a finite natural resource: land. To examine land access politics at the intersections of mining and agriculture using Ghana as a case study, we adopt a unique blend of Amartya Sen's capability approach and political ecology approach. Our study draws on secondary information, on-site observations, and primary data acquired from interviews and focus group discussions with stakeholders in both sectors. Through the lens of political ecology, our research highlights the significant powers of state actors, especially in the mining sector, on land access, exacerbating tensions and conflicts among non-state actors like small-scale miners, smallholder farmers, and traditional authorities. Additionally, by applying the capability approach, we uncover the diverse agency-driven strategies employed by non-state actors, sometimes operating outside existing laws, and we emphasize the competitive dynamics between small-scale miners and smallholder farmers as they vie for land resources to support their economic activities. We therefore argue that the spatial and socio-economic interconnectedness of mining and agriculture is rife with dramatic tensions underpinned by unequal power relations and a hierarchical structure of actors within the two sectors, with potential for zero-sum or worse than zero-sum outcomes for humans and the physical environment at multiple scales.

1. Introduction

For centuries, the mining and agriculture sectors have held pivotal roles in numerous African countries, wielding influence over job creation, foreign exchange, and gross domestic product. However, in light of the declining prominence of agriculture as the primary livelihood and the diversification of livelihood options across Africa (Banchirigah and Hilson, 2010; Okoh and Hilson, 2011; Hilson and Garforth, 2012), the mining sector, particularly small-scale mining, has emerged as a significant alternative for a diverse range of rural inhabitants, including women and educated youth (Hilson and Garforth, 2012, 2013; Arthur-Holmes and Abrefa Busia, 2022; Arthur-Holmes et al., 2022).

Over the years, scholars and institutions alike have endeavoured to fathom the intricate relationship between mining and agriculture. In an exploration of scholarship concerning the nexus between mining and agriculture, a couple of issues come to the fore: the intricate interplay of mining and agriculture as economic pursuits and the competitive dynamics that ensue within these two sectors (Ofosu et al., 2020). A plethora of comprehensive studies has examined these multifaceted issues from various angles and through diverse theoretical lenses (See Cartier and Burge, 2011; Hilson and Garforth, 2012, 2013; Hilson, 2016a; African Center For Economic Transformation, 2017a, 2017b; Chigumira, 2018; Mkodzongi and Spiegel, 2019; Ofosu et al., 2020; Hilson and Maconachie, 2020; Brugger and Zanetti, 2020; Baffour-Kyei et al., 2021; Huntington and Marple-Cantrell, 2022; Poignant, 2023). In a study conducted by Hilson and Garforth (2012, 2013) in Ghana and Mali, the authors postulated that many farmers are increasingly diversifying into small-scale mining due to agricultural impoverishment. Drawing upon literature from diverse Sub-Saharan African nations, including Sierra Leone, Mozambique, Mali, Zimbabwe, among others,

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https://doi.org/10.1016/j.exis.2023.101357
Received 27 April 2023; Received in revised form 26 September 2023; Accepted 27 September 2023
Available online 12 October 2023

Hilson (2016a) reiterated the pronounced symbiotic relationship existing between mining and agriculture in Sub-Saharan Africa, anchored in seasonality and the waning viability of agriculture. It is evident in the literature that individuals engage in small-scale mining activities during the agricultural off-peak season, typically in the dry season, to bolster their household incomes (Maconachie and Binns, 2007; Kamlongera, 2011). Furthermore, the proceeds from small-scale mining often find their way into ailing farming ventures, such as the purchase of fertilizers and other agricultural inputs (Okoh and Hilson, 2011; Hilson and Garforth, 2012, 2013).

Despite these symbiotic relationships, a substantial body of literature underscores the competitive interactions between mining and agriculture, revealing some adverse consequences primarily rooted in the environmental spillovers of this relationship (Kitula, 2006; Boadi et al., 2016; Hilson and Laing, 2017; Ofosu et al., 2020; Poignant, 2023; Siaw et al., 2023). For instance, in a recent study conducted in Tanzania, Poignant (2023) uncovered a paradoxical outcome: contrary to expectations of positive investment spillovers from small-scale mining to smallholder agriculture, farmer households tend to allocate fewer resources to agriculture and produce less output when small-scale gold mining sites emerge nearby. In another study conducted in Ghana by Siaw et al. (2023), the authors shed light on the ramifications of selling farmlands previously utilised for cocoa farming, uncovering the detrimental impact on the livelihoods of landless farmers and, indeed, on agricultural production at large.

The competitive dynamics between mining and agriculture predominantly centres on the fundamental resource that sustains both economic endeavours: land. The acquisition of land for these two sectors is subject to a multifaceted web of power dynamics operating at various scales and among diverse stakeholders, including state actors, miners, farmers, and traditional authorities, frequently leading to tensions and disputes in the process. This intricate landscape is further shaped by the pervasive influence of extant policies, many of which are propagated by international entities. What is particularly noteworthy, however, is the limited attention given to the power dynamics and the capabilities of these diverse actors—ranging from the state apparatus to miners and farmers—at the intersection of mining and agriculture in existing scholarship. In this article, therefore, we seek to enrich the corpus of knowledge concerning the intricate nexus between mining and agriculture. We do so by unravelling the nuances of land accessibility within the mining and agriculture interface in Sub-Saharan Africa, using Ghana as a pertinent case study. We adopt a distinctive blend of Sen's capability approach and the political ecology framework (Watts, 1983a, 1983b; Blaikie, 1985; Sen, 1985, 1992a, 1992b, 1999; Blaikie and Brookfield, 1987; Crocker, 2008; Crocker and Robeyns, 2009; Robeyns, 2017; Robbins, 2019), thereby illuminating the complexities of land access within this critical intersection. We explore the spatial and socio-economic interdependencies between the mining and agriculture sectors, as well as the power structures and hierarchies that shape land access. Given the persistent, yet unresolved, debates enveloping this relationship, our study elucidate the nuanced character of the mining-agriculture connection. We place particular emphasis on the tensions and conflicts arising in the context of land acquisition, the political negotiations that transpire, and the role played by individual agency in shaping these negotiations.

From a political ecology perspective, our research reveals the complex power dynamics that influence land access in areas where mining and agriculture intersect. We found that state actors, especially those in the mining sector, hold significant authority over land access. In some cases, their power surpasses that of other state actors within the agriculture sector. This strong state influence often intensifies tensions and conflicts among different stakeholders in both sectors, including small-scale miners, smallholder farmers, and traditional leaders. Using the capability approach, we documented various agency-driven strategies employed by non-state actors, sometimes operating beyond existing laws. For instance, we uncovered competition between small-scale miners and smallholder farmers as they seek land resources to support their economic activities. This competition can involve principles like survival of the fittest, voluntary agreements, and even coercion, placing smallholder farmers with limited land holdings at a disadvantage in this process.

We therefore argue that the spatial and socio-economic interconnectedness of mining and agriculture is rife with dramatic tensions underpinned by unequal power relations and a hierarchical structure of actors within the two sectors, with potential for zero-sum or worse than zero-sum outcomes for humans and the physical environment at multiple scales.

The paper is structured as follows: the first section introduces the paper, followed by the second and third sections, which presents pertinent literature that looks at the spatiality and socio-economic interconnectedness of mining and agriculture in general and the heterogeneous and burgeoning nature of the small-scale mining sector. The fourth section presents the theoretical and conceptual framework that underpins the study, while the fifth section describes the study methodology. The sixth section succinctly outlines the influence of socio-economic and political changes on the ongoing conflict between mining and agricultural land utilisation. Moving on to the seventh section, we employ a diagrammatic depiction to delve into the power dynamics and hierarchical framework among the principal actors operating within the mining and agricultural sectors. In the eighth section, we undertake a comprehensive analysis of the power dynamics and capabilities for land access pertaining to both mining and agriculture. This section specifically addresses the intricate concerns associated with land negotiations, acquisitions, and compensation. Lastly, the concluding section encapsulates the findings and implications derived from the study.

2. The spatiality and socio-economic interconnectedness of mining and agriculture in sub-Saharan Africa

Sub-Saharan Africa exhibits a wide array of agro-ecological zones, spanning from fertile agricultural regions to mineral-rich areas. In certain regions, there is a notable convergence of suitability for both agriculture and mining, enabling concurrent or mutually beneficial land utilisation and vice versa. Notably, countries such as Ghana, Mali, and Burkina Faso exemplify instances where gold mining operations often coincide with areas possessing agricultural potential. For instance, the forest zone of Ghana, which accounts for 57 % of overall food crop production (Diao et al., 2019), also contains 61 % of gold-bearing landscapes (see Map 1). Consequently, the same geography that is suitable for food crop production is also conducive to gold mining, with both sectors coexisting in close proximity. As a result, any environmental changes that impact mining or agricultural productivity have implications for the other subsector, leading to tensions between the two.

Mining and agriculture in Sub-Saharan Africa stand as intertwined socio-economic pursuits, both heavily reliant on natural resources. This dependence inevitably engenders a contentious dynamic, characterised by rivalry over access to and utilisation of land resources. The literature on the subject has acknowledged these direct connections between these activities, yet divergent viewpoints persist regarding the nature of this relationship. On one hand, a body of research posits that these activities complement each other, citing works by Maconachie and Binns (2007), Kamlongera (2011), Okoh and Hilson (2011), Hilson and Garforth (2012, 2013), and Hilson (2016a, 2016b) to support this perspective. On the other hand, an opposing school of thought contends that the relationship is one of competition, as elucidated by the studies of Boadi et al. (2016), the African Center for Economic Transformation (2017a, 2017b), Poignant (2023), and Siaw et al. (2023), as expounded upon in the introductory section of this article. The dialectical nature of these positions continues to intrigue and challenge researchers in this domain.

Small-scale mining plays a crucial role as a means of livelihood

within the Sub-Saharan Africa region and exhibits a close interconnection with subsistence agriculture (Hilson, 2016a, 2016b; Hilson and Maconachie, 2020b). It serves as a valuable non-farm alternative for small-holder farmers, enabling them to augment their incomes and secure land tenures in various Sub-Saharan African nations, including Ghana (Hilson and Garforth, 2013; Hilson, 2016a, 2016b; Baffour-Kyei et al., 2021; Adranyi et al., 2023), Zimbabwe (Chigumira, 2018; Mkodzongi and Spiegel, 2019), Guinea (Huntington and Marple-Cantrell, 2022), Tanzania (Fisher et al., 2009) and Burkina Faso (Pokorny et al., 2019). The aforementioned corpus of literature emphasises the significant role of livelihood diversity within the intersection of small-scale mining and agriculture, shedding light on the intricate dynamics at play. Specifically, it illustrates how income derived from small-scale mining activities can be reinvested as funds in agriculture, and vice versa. Moreover, it elucidates the transformative impact of small-scale mining on the fortunes of women involved in agriculture, enabling them to overcome the constraints associated with this sector (Hilson and Maconachie, 2020b). Consequently, this underscores the imperative to formalise small-scale mining in order to maximize its potential benefits (Hilson and Maconachie, 2020b).

It is crucial to emphasise that within the intersections of small-scale mining and agriculture, there exist varying and unequal livelihood trajectories, which primarily depend on the capabilities of individuals and households. In recent research conducted by Adranyi et al. (2023), the researcher identified three distinct livelihood trajectories: consolidating, fluctuating, and marginalised. The authors argue that the consolidating trajectory is pursued by households who possess power and influence in their communities. These households are characterised by relatively high incomes, access to extensive farmland, secure land tenure, and institutional support. They thrive through a combination of factors such as access to emerging external markets, capital, social networks, progressive knowledge, and the positive effects of small-scale mining. On the other hand, households following the fluctuating trajectory experience low-income levels and possess small farmlands or engage in caretaker farming or wage labour in agriculture or service sectors. These households proactively transition into small-scale mining due to its potential for high and rapid financial returns. Lastly, households on the marginalised trajectory typically originate from impoverished backgrounds and face marginalisation due to severely limited access to livelihood resources, including land, as well as a lack of power and influence. These households heavily rely on farming for both income and subsistence, making them disproportionately vulnerable to the negative impacts of small-scale mining, such as increased degradation of farmland and water bodies. The authors conclude that while the consolidating and fluctuating livelihood trajectories at the intersections of small-scale mining and agriculture tend to move toward development, the marginalised trajectory leads to further impoverishment. This observation aligns with the findings of the present study, which will be discussed in subsequent sections.

While positive synergies between mining and agriculture have been established primarily on the socio-economic front, the environmental aspects of the relationship also require thorough examination. A one-sided argument may result in superficial recommendations that fail to provide comprehensive solutions, leading to positive outcomes benefiting only a small group of actors while the costs are borne by society as a whole (Pigou, 1920). Numerous studies have identified adverse connections between mining and agriculture from an environmental standpoint. The environmental costs of mercury-polluted water affecting agricultural activities (Amonoo-Neizer et al., 1996; Golow and Adzei, 2002; Golow and Mingle, 2003; Clifford, 2017; Gyamfi et al., 2021) and the invasion of farmed areas for mining operations (Snapir et al., 2017; Awotwi et al., 2018; Hausermann and Ferring, 2018; Ferring and Hausermann, 2019; Obodai et al., 2019) both pose significant negative externalities on persons and communities, leading to deforestation and its associated consequences, including worsening climate change effects (Hausermann et al., 2018). The next section presents a review of the literature concerning the complex and rapidly expanding realm of small-scale mining, incorporating multiple perspectives and contentious issues surrounding this field.

3. Unearthing complexity: the heterogeneous and burgeoning small-scale mining sector

The small-scale mining sector has experienced remarkable growth over the past two decades, a development that has coincided with an increase in complexity. As evidenced by studies conducted in the Philippines (Verbrugge and Besmanos, 2016), Tanzania (Fisher, 2007), Zimbabwe (Mkodzongi and Spiegel, 2019), and Ghana (Crawford et al., 2016; Tschakert, 2016), the sector has evolved considerably, with the emergence of new financiers and labour arrangements. In the Philippines, for instance, the once rudimentary small-scale mining industry has undergone significant changes, as artisanal mining now coexists with more mechanised medium-scale operations. This has led to a growing differentiation between a class of artisanal and small-scale entrepreneurs and a massive workforce, as well as a multi-tiered division of labour and complex arrangements for the distribution of risks and benefits across the sector's diverse participants (Verbrugge and Besmanos, 2016, p. 136). These same trends are evident in other mining countries in Sub Saharan Africa, where financiers and labour arrangements have evolved considerably over the last decade (Fisher, 2007, 2008; Crawford et al., 2016; Tschakert, 2016).

The emergence and rapid growth of small-scale mining activities can be attributed to a complex interplay of both global and local drivers. Globally, the demand for natural resources has increased dramatically as a result of population growth and economic prosperity, especially in emerging economies such as China (Balatsky et al., 2015; Preston et al., 2016). The rise in natural resource prices, notably gold and diamonds, has also fuelled small-scale mining activities (Bryceson et al., 2014; Seccatore et al., 2014; Tschakert, 2016; Hausermann et al., 2018; Chigumira, 2018; Barenblitt et al., 2021). The period following the 2008 financial crisis saw an unprecedented surge in gold prices, which was a significant driver of small-scale gold mining activities in several countries. This surge, known as 'gold rush mining,' has even occurred in countries with no previous history of mining activities (Bryceson and MacKinnon, 2012).

Additionally, local drivers have played a significant role in the growth of small-scale mining activities. There have been two opposing narratives that shape the debates around local drivers (Hilson and Garforth, 2012). The first narrative, which previously reflects the perspectives of policymakers and development partners (Banchirigah, 2008; Hilson and Garforth, 2012), but currently a wider group of scholars, views the small-scale mining sector as an ideal environment for indigenous entrepreneurship. It is believed that an increasing number of people are looking to "get rich quick," making this sector a viable profession with high returns for powerful elites with political connections and financial capabilities (Crawford et al., 2016; Mkodzongi and Spiegel, 2019). Several studies highlight the negative impact of flexible mining regulations, which are often abused by powerful elites to marginalise and exclude indigenous poor mining workforces (See Fisher, 2007, 2008; Verbrugge, 2015; Verbrugge and Besmanos, 2016).

On the other hand, the second narrative is a rebuttal to the perception of small-scale mining as a magnet for "greedy" and "get rich quick" individuals. This narrative argues that the growth of the sector is largely due to the declining fortunes of agriculture, particularly in Africa (Hilson and Garforth, 2012, 2013; Bryceson et al., 2014; Afriyie et al., 2016). According to Bryceson et al. (2014), with contracting global markets for African smallholder agricultural exports since the late 1970s, there have been large-scale de-agrarianisation processes and a search for alternative sources of income for impoverished rural households. As a result, many African nationals employed in agriculture are seeking employment and survival in other sectors, including small-scale mining. Hilson and Garforth (2012) however asserts that while

small-scale mining does not entirely replace smallholder farming, as the term "de-agrarianisation" implies, it coexists with subsistence farming in some countries. However, in other countries, small-scale mining competes with smallholder agriculture (African Center For Economic Transformation, 2017; Hausermann et al., 2018; Ferring and Hausermann, 2019). These two narratives have shaped the debates over the drivers of the rapid growth of the small-scale mining sector, and they highlight the complex and multifaceted nature of this phenomenon.

Hilson and Hu (2022) have recently introduced a new perspective that small-scale mining is a "platform for wealth creation". This emerging narrative aims to address criticisms of the traditional notions of small-scale mining being driven solely by the desire to escape poverty or achieve quick financial gains. Fisher et al. (2009, p. 32–33) have argued against the prevalent metaphors of the "poverty trap" or "poverty cycle" in describing small-scale mining, suggesting that such oversimplified representations fail to capture the multifaceted dynamics of change within small-scale mining communities. According to the "platform for wealth creation" discourse, a considerable segment of the population in sub-Saharan Africa has turned to small-scale mining as a means of alleviating poverty. For many individuals involved in small-scale mining their livelihoods become intricately linked to mineral extraction. As they adapt to the challenges of the informal small- scale economy and acquire the necessary skills, some of them have succeeded in accumulating wealth, establishing their own mining plots, employing labourers, and even exploring financial and sponsorship opportunities within the sector (Hilson and Hu (2022). The discourse further posits that while some individuals remain entrenched in the informal small-scale mining economy, others have obtained permits, thereby unlocking new avenues for financing and technological advancement. However, it is important to acknowledge that there are also individuals who, driven by dire circumstances, venture into small-scale mining with uncertain futures but manage to leverage the sector as a 'platform for wealth creation' through diverse approaches (Hilson and Hu, 2022, p. 97). Hilson and Hu (2022) utilisation of a case study in Ghana, illuminates how revenues derived from small-scale mining have been strategically reinvested into lucrative enterprises, including hotels, petrol stations, restaurants, service and supply provisions, as well as community facilities and services. While it is generally true that the involvement of established, well-connected, and affluent political elites and entrepreneurs cannot be completely dismissed in the small-scale mining sector, it is important to acknowledge that this claim does not negate their participation entirely. This is exemplified by a recent report from the Former Minister of Environment, Science, Technology, and Innovation of Ghana, which revealed the indictment of certain state officials as sponsors of illegal mining activities (Frimpong-Boateng, 2021). The said report shed light on the audaciousness with which state officials wielded their authority to participate in and promote illicit small-scale mining endeavours within forest reserves, all while evading consequences. Predictably, the presidential administration, upon receiving the report, dismissed its significance, deeming it mere hearsay. They asserted that the document in question held no official standing, as it had been informally submitted rather than formally presented to the Cabinet. The subsequent section endeavours to explicate our methodology in which we have amalgamated the capability and political ecology approaches to disentangle the intricacies surrounding the politics and accessibility of land for mining in the intersections of mining and agriculture.

4. Theoretical framework: a combination of the capability approach and political ecology

This study combines the capability and political ecology perspectives to examine the interconnections between mining and agriculture, as well as the tensions and potential outcomes associated with accessing land. The capability approach, developed by Sen (1985, 1999), is used to conceptualise and critically analyse the livelihoods of mining and agriculture due to its evaluative prescription for comprehending an individual's achieved wellbeing (Robeyns, 2017). The approach represents a complex and versatile framework for a range of evaluative exercises. Its most prominent applications include the assessment of individuals' well-being and freedom levels, the evaluation of social institutions and arrangements, and the design of social policies and changes (Robeyns, 2017). At its core, the capability approach is based on two normative claims: the importance of achieving well-being and the dependence of this achievement on people's capabilities. These two key concepts are known as *"functionings"* and *"capabilities,"* respectively, as introduced by Sen (1992a). Functionings comprise both "beings" and "doings," which denote the various states of human beings and activities that individuals can engage in to achieve well-being, such as being adequately nourished, educated, in good health, achieving self-respect, or being socially integrated. In contrast, capabilities refer to individuals' actual freedoms and opportunities to achieve their functionings, such as access to food, education, resources, and so on. For instance, in the context of this study, mining, and agriculture are all examples of functionings that depend on individuals' real opportunities (capabilities) to achieve them, such as access to land and enabling policies and regulations. From a broader perspective, the capability approach serves as a tool for evaluating more than just an individual's well-being. Rather, it also considers other dimensions of value, such as agency (Crocker and Robeyns, 2009).

More importantly, Power relations are significant conditions that affect the attainment of achieved wellbeing, and are determined by legislative and customary laws, which vary at different scales. To address the complexities of power relationships, political ecology is used as a theoretical lens to delve into such power dynamics from a multi-scalar and historical perspective perspectives (Bryant, 1997; Neumann, 2015; Ahlborg and Nightingale, 2018; Svarstad et al., 2018; Robbins, 2019). Political ecology can also explain the ecological impacts associated with such power dynamics by providing useful insights into human-environment interactions (Davis, 2009). The theoretical framework of political ecology posits a complex interplay between human societies and their natural surroundings, where any disturbance or pressure exerted on any of the interconnected components of this relationship can have far-reaching repercussions across the entire system (Robbins, 2019) Despite the fact that all actors within this system experience stress, political ecologists acknowledge that the impacts of environmental change are typically distributed unevenly, with certain individuals or groups bearing a disproportionate burden of the costs and benefits (Bryant and Bailey, 1997). This uneven distribution of costs and benefits perpetuates or exacerbates existing social and economic inequalities, with significant political implications for how different actors wield power and influence within the system (ibid).

The study integrates the capability and political ecology approaches and employs a diagrammatic representation of the major components of the two approaches to serve as a conceptual framework for gathering and analysing empirical data. The framework is summarised with particular emphasis on the components of this paper in the next paragraphs.

The critical components of the political ecology and capability approaches, as well as the study's primary issues (mining and agriculture), are outlined in Fig. 1. The framework represents a macro-micro level frame with multiple layers that begins at the bottom with the relationships between humans and their environment and ends with a micro-level analysis focused on the individual and their wellbeing. Importantly, the achieved wellbeing of the individual has an impact on the relationships between humans and their environment, making the situations cyclical. In this paper, we emphasise the capability of accessing land for the attainment of the functioning of mining and agriculture.

The base of the conceptual framework symbolises the interaction of humans with their environment, as best demonstrated and understood through political ecology. Three key methodologies of political ecology – historical analysis, power analysis, and multi-scalar analysis – were

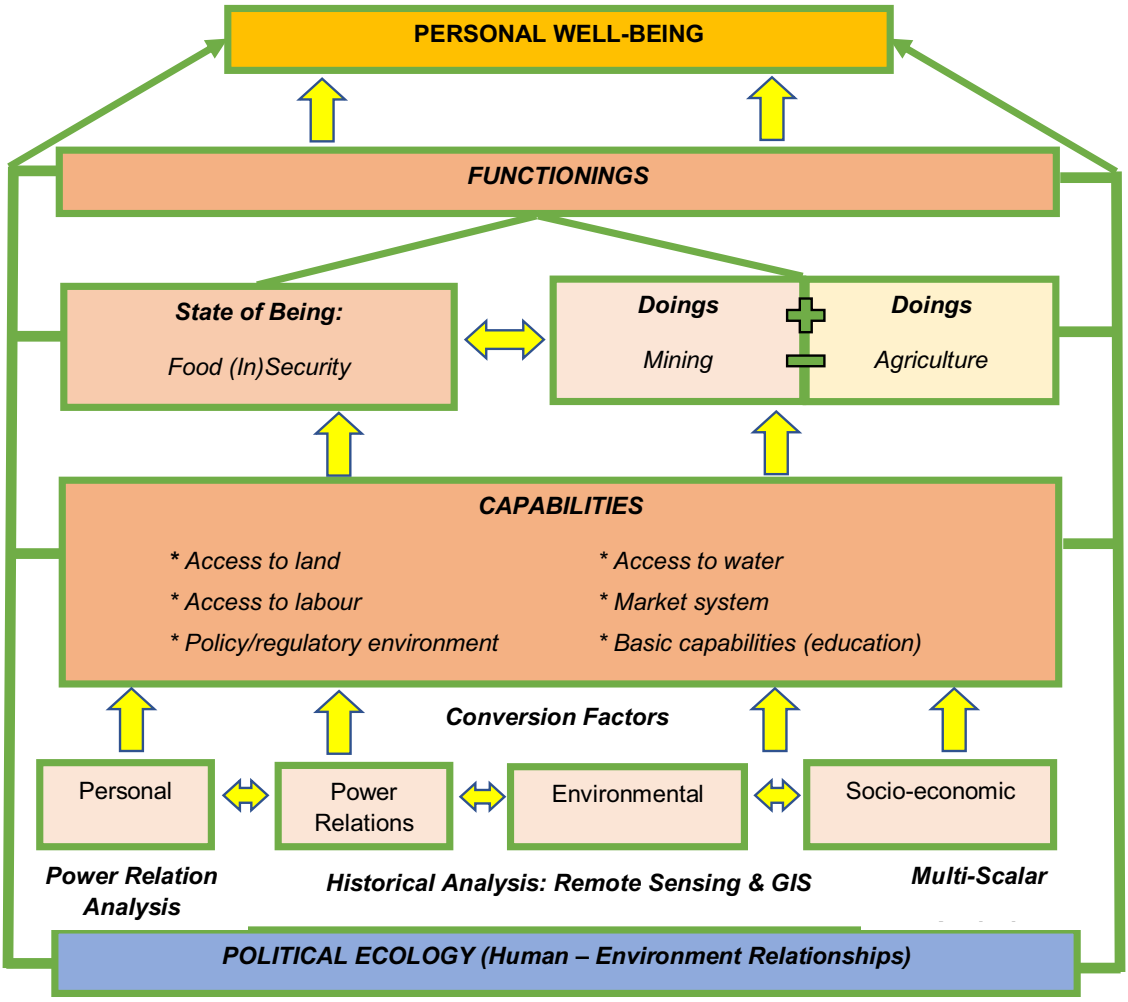


Fig. 1. Conceptual framework of the novel blend of political ecology and the capability approaches.

utilised in the entire research to appreciate the context-specific analysis of human-environment interactions. An individual's capability is shaped by a range of factors (the conversion factor) that interact with one another. These elements encompass the four basic categories of conversion factors: personal, environmental, power, and socio-economic.

Critical capabilities such as access to land, water, and labour have been identified as factors affecting mining and agriculture, and consequently food security. In this paper, the focus is on access to land. It is important to clarify that in this instance, the term 'access' refers to the capacity to benefit (Ribot and Peluso, 2003). Thus, mining and agriculture were conceptualised as a person's 'functionings', which ultimately define that person's overall well-being. Based on the conceptual framework, the following key research questions in relation to this paper were generated: what are the power structures and relations among key actors within the mining and agriculture sector? What are the impacts of these power dynamics on the capability of accessing land? What are the outcomes of these power dynamics and access capabilities to humans and the environment at multiple scales? The methods adopted in gathering and analysing data for this paper will be presented next.

5. Methods and research context

Ghana was chosen as a case study due to its well-established gold mining sector, which bears similarities to other gold-mining nations in Sub-Saharan Africa, and because it is the largest gold producer in Africa and sixth largest in the world (Ghana Chamber of Mines, 2021; World Gold Council, 2021). Within Ghana, the former Amansie West District (AWD) was selected as a case study due to its significant gold mining activity and its predominantly agricultural nature (Ghana Statistical Service, 2014).

The AWD is situated between Longitude 6.05°, 6.35 ° West and Latitude 1.40°, 2.05 ° North (Map 2) and spans a total land area of 1230 km^2, accounting for 5 % of the Ashanti Region's land area. The district is drained by the *Offin* and *Oda* rivers and their tributaries, and it experiences a double maxima rainfall regime, characterised by a wet semi-arid climate with two seasons: major (March–July) and minor (September–November). The AWD's vegetation is primarily rain forest with wet semi-deciduous features, creating exceptionally fertile soil that supports agriculture as the primary source of subsistence throughout the district. Additionally, the district is home to four significant forest reserves: Oda River, Apanprama, Jemira, and Gyeni River. As of 2020, the district's population was estimated to be 174,218, with an average growth rate of 2.6.

Ethical considerations were considered throughout the data collection process, with approval received from the Human Research Ethics Committee of the Open University (Reference: HREC/3390/XXXX). Purposive and referral sampling techniques were utilised to carefully select 87 participants for the study, including farmers, miners, officials at national/regional and local state organisations, and opinion leaders in the local areas. To supplement the primary data collected through in-depth and key informant interviews, focus group discussions, and field observations, we also reviewed secondary information from official institutional reports, national policies, state laws, regulations, peer-reviewed published works, and online media.

Following the data collection phase, we transcribed and catalogued the audio recordings of interviews, assigning each raw data a unique serial number for ease of reference in NVivo Plus 12. The transcripts were then analysed using (Braun and Clarke, 2006) six-stage thematic analysis process. First, we familiarised ourselves with the datasets by reading the transcripts multiple times. Second, initial codes were constructed based on emergent themes. Third, the data was coded using multiple codes that corresponded to the study's research questions. Fourth, emergent codes were sorted and studied for potential themes, which were then classified into selected themes. Fifth, the primary sub-themes were reviewed and refined in connection to the coded themes and the complete dataset to maintain consistency. Finally, we identified and labelled the codes and themes before analysing and writing the findings in this article.

6. The battle for land use: how socio-economic and political changes fuelled mining and agriculture tensions in Africa

This discourse aims to delve into the significant disagreements that have arisen due to past political, social, and economic structure and policy changes in the mining and agriculture subsectors. It is notable that historical disputes between these two subsectors have not been well-documented in the literature because they have been studied independently in terms of their historical, political, social, and economic development.

Through historical examination, two key points of conflict and their associated ecological footprints may be discovered in the mining and agriculture subsectors. Firstly, analogous policies implemented in the two subsectors had comparable outcomes. For instance, the social, political, and economic conditions that facilitated gold rushes during the colonial era (See Ofosu-Mensah, 2011; Bebbington et al., 2018) and their associated ecological footprints were analogous to the initial promotion of plantation agriculture (Dickson, 1969; Gyasi, 1996; Huddleston and Tonts, 2007), which gradually marginalised peasant farmers. During the post-independence period, significant developments unfolded as mines were nationalised and agriculture modernised in many African countries (Campbell, 2004, 2009, 2010; Birner and Resnick, 2010).These changes further fuelled the simmering animosity between mining and agriculture. The nationalisation of mines in many Sub-Saharan Africa countries for example resulted in the state acquiring agricultural lands with substantial mineral reserves, assuming custodianship over them on behalf of the populace. This marked the initial shift from agricultural to mining land use, a transition that later became exploited at the local level by both political elites and illegal miners, as elucidated in subsequent sessions of this article.

Secondly, identical political, social, and economic policies used in the mining and agriculture subsectors had antagonistic impacts, especially during the implementation of the Economic Recovery Programme and its associated structural changes. The policy of trade liberalisation, for example, lowered the cost of imports and facilitated the establishment of mining organisations and operations, leading to the displacement of peasants and destruction of natural resources (Cheru, 1992). Simultaneously, this policy fostered small-scale and large-scale mining, which resulted in unemployment caused by industry privatisation in both large-scale mining and other economic activities (Hilson, 2004). Banchirigah (2006) highlighted the impact of mining reform in sub-Saharan Africa, with regards to the expansion of large-scale mining. According to the author, this reform has resulted in a reduction of land available for peasant farming and has triggered a significant shift in the agricultural labour force, as exemplified in Ghana and Tanzania. For example, in Tarkwa, a community located in Ghana, the implementation of mining reforms resulted in a substantial clearance of land and vegetation to accommodate surface mining operations. This, in turn, triggered a frantic competition for available farmlands (Akabzaa and Darimani, 2001). The consequences extended beyond mere agricultural land degradation; it also led to a reduction in the available land for agricultural production. As a consequence, the customary practice of employing the bush fallow system, which was historically effective in recycling significant nutrient quantities and enhancing the productivity of subsequent cultivation cycles, became unfeasible due to the severe land scarcity (ibid). It is interesting to note that the dynamics and flashpoints of antagonistic outcomes of social, economic, and political policies affecting mining and smallholder farming have remained relatively constant over time, except for the dynamic and ecological imprints. The upcoming section, we undertake a deeper exploration of the intricate power dynamics that govern the interactions between various stakeholders within the mining and agriculture industry. These power dynamics serve as the fundamental framework for determining the accessibility of land for mining and other land-based activities.

7. Power struggles in mining-agriculture landscapes: exploring asymmetrical relations

The power dynamics between state and non-state actors are complex and asymmetrical. The literature suggests that these power relations result in disproportionate costs and benefits (Bryant, 1997). Although it is challenging to describe the constituents of these power relations using a single model, based on primary data and existing literature, and through the lens of the capability and political ecology approaches, we have summarised the power structure and relationships among key actors in the mining and agriculture sector. Fig. 2 provides a visual representation of these relationships, which affect the ability to access land as discussed in subsequent sections.

The power structure and relations among the key actors in the mining and agriculture sectors are influenced by globalisation and international actors' neoliberal agendas (Tsikata, 1997; Akabzaa and Darimani, 2001; Ofosu-Mensah, 2011). The five principal actors that hold and exert varying degrees of power to regulate access to land resources can be classified into three non-exclusive tiers based on the multi-scalar analytical frame of political ecology. At each level of power, one actor or a group of actors exercises direct influence over another actor.

At the national scale, the state actors wield the highest form of power over any non-state actor concerning mining and agriculture. In Ghana, the principal state actors prominently feature the Minerals Commission, the Forestry Commission, the Ministry of Land and Natural Resources, and the Ministry of Food and Agriculture. Current state laws and regulations vest these state entities, especially those presiding over the mining sector, with excessive power over natural resource governance and allocation, often at the cost of more marginalised and less influential stakeholders. For instance, in Ghana, the Minerals and Mining Act of 2006 (Act 703) authorises the Minister of Lands and Natural Resources to negotiate, grant, revoke, suspend, or renew mineral rights and issue licenses on conditions determined by the Minister, thereby conferring undue power on state actors. A parallel pattern is evident in other Sub-Saharan African nations with a substantial mining industry. These state laws and regulations are structured and supported by externally negotiated neoliberal policies promoted by international organisations such as the World Bank and the International Monetary Fund, which prioritise capitalism in favour of foreign investors (Akabzaa and Darimani, 2001; Abdulai, 2017). Furthermore, some of these state laws erode the power of other actors, including traditional authorities, and fail to adequately account for other less powerful actors, particularly the poor at the local scale, when it comes to land access for mining (Hausermann et al., 2018).The excessive power of the state reflects a colonially

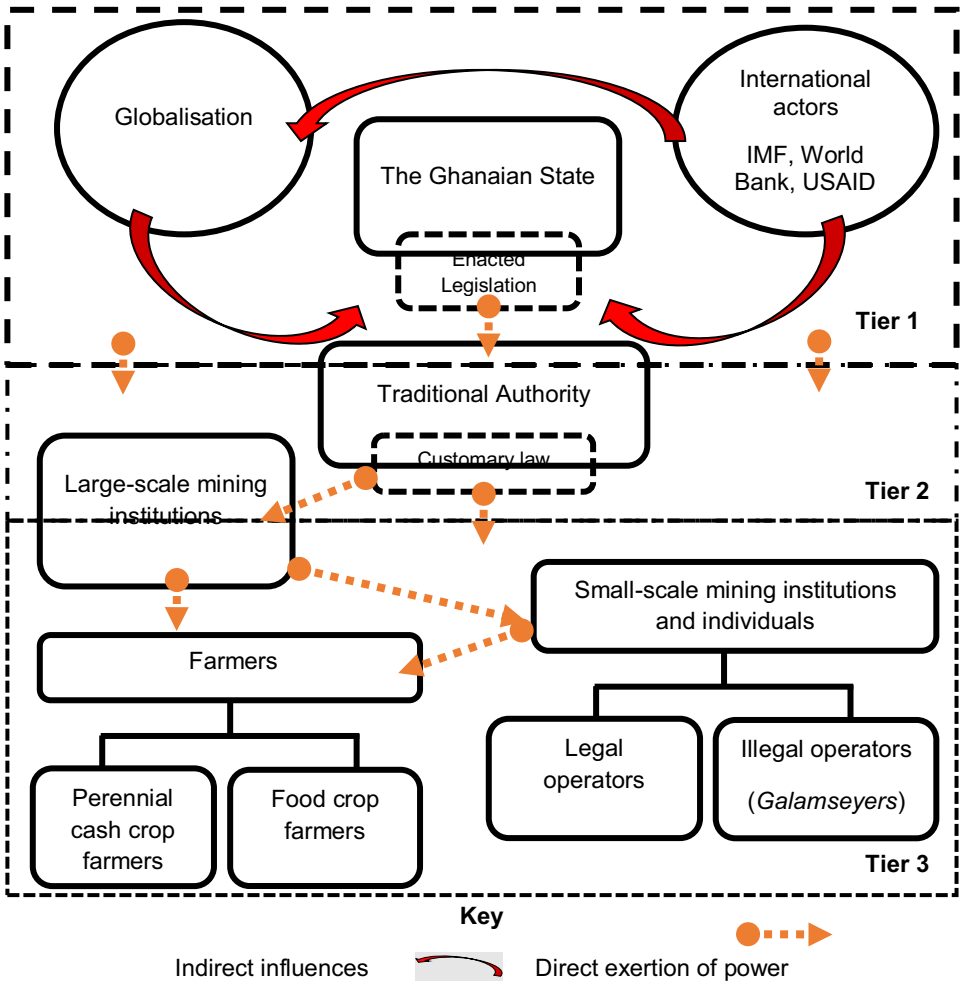


Fig. 2. Power hierarchy amongst state and non-state actors.

orchestrated bifurcated state that exercises two distinct forms of power under a single hegemonic power: civil[1] and customary[2] power, and distinguishes between 'citizens' and 'subjects,' 'natives' and 'non--natives' (Mamdani, 2018, P.61).

It is indeed worth noting that, within the agricultural sector, state actors possess powers that are ostensibly analogous to those held by their counterparts in the mining sector, all underpinned by laws and regulations designed to facilitate the advancement of large-scale farming endeavours. However, the practical manifestation of these powers presents a striking contrast between these two sectors. In the mining sector, state actors wield a dominance that surpasses that of any other entity, particularly in the domain of land allocation and use. Conversely, within the agricultural sector, the powers vested in state actors are circumscribed to a degree commensurate with those of traditional authorities, with the latter retaining preeminent authority in matters pertaining to land allocation for agricultural purposes. The overarching influence of traditional authorities looms large in the landscape of agricultural land allocation. State actors, in contrast, find their powers primarily channelled toward the spheres of policy formulation and implementation. Consequently, in an interview with a Director at the national office of the Ministry of Food and Agriculture, the issue of access to land for farming emerged as a salient impediment, particularly with regard to large-scale agricultural ventures. The Director, in elucidating the situation, conveyed the following insight:

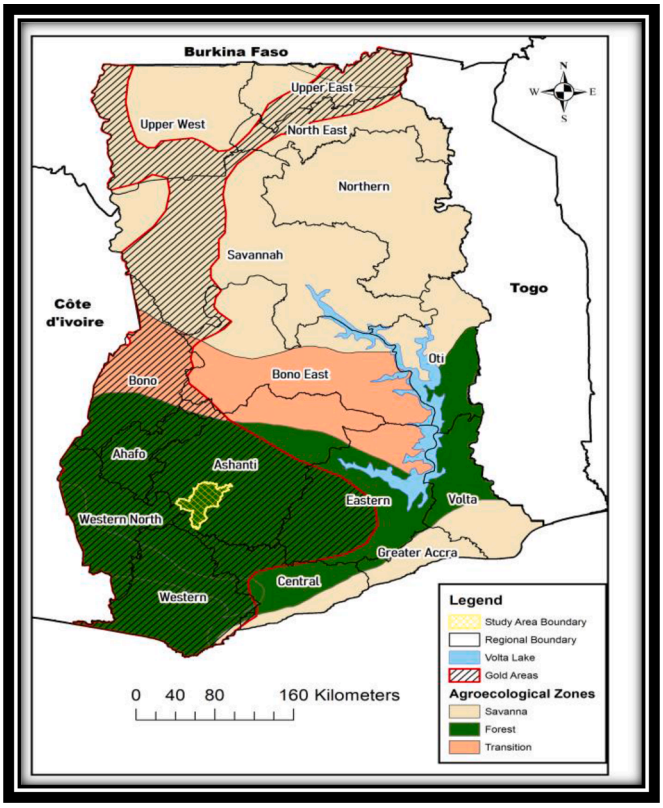
"Access to land has however been a major issue and I am not sure how we handled it in the policy and investment plan. Even the last time budget was presented to the Ministry of Finance, the issue of access to land came up. It was raised that some investors have move to other countries because of access to land issue and that if the Ministry can prioritise land access to the extent of even purchasing land and making them available to investors, it will help. It was even recommended that if land access can be reprioritised or even direct fertiliser subsidies into land access". KII_003_M_NS.

From the above, the critical nature of the issue of land access for agriculture can be discerned as well as the uncertainty about how it's been addressed within the current policy and investment plan. However, the constrained accessibility of land according to the state actor is not so much a quandary for smallholder farmers as it is a matter chiefly concerning foreign investors and the incentivisation of expansive agricultural undertakings. This notably parallels the strategies employed in the promotion of large-scale mining endeavours within the mining sector.

It is imperative to highlight that the agricultural state actors, both at the national and regional levels, grappled with a dilemma when it came to land allocation and utilisation in the presence of small-scale mining activities. An illustrative example emerged during a focus group discussion with farmers, wherein the study revealed that lands within forest reserve areas, originally designated by the Forestry Commission

[1] *Civil power was organised institutionally based on differentiations. It claims to defend rights ideologically, while economically it regulates market transactions and ensures the reproduction of market relations* (Mamdani 2018, p. 60)>.

[2] *Customary power was organised institutionally based on power fusion. It claims to enforce custom from an ideological standpoint. Economically, it was situated at the crossroads of market and non-market relations, mediating the link via extra-economic coercion* Mamdani (2018, p. 60).



Map 1. An overlay of Ghana's agroecological zones with gold areas. Source: author's construct with data from Ghana land use and spatial planning authority, and the forestry research institute of Ghana (FORIG).

for agricultural and reforestation purposes, were subsequently reallocated to small-scale miners. Moreover, some of these lands fell prey to encroachments by illegal miners, a situation that farmers affected by this phenomenon repeatedly reported. Below, we present verbatim quotes from select focus group participants elucidating this predicament.

"On the issue of access to land, the government has recently permitted us to farm in parts of the forest reserve (Apamprama forest Reserve). This began last year, and we are to grow trees whiles we grow our crops. The sad thing is that the part of the forest reserve that we were assigned for farming has now been given out to be used for galamsey activities." (R5: FGD_OD002_F)

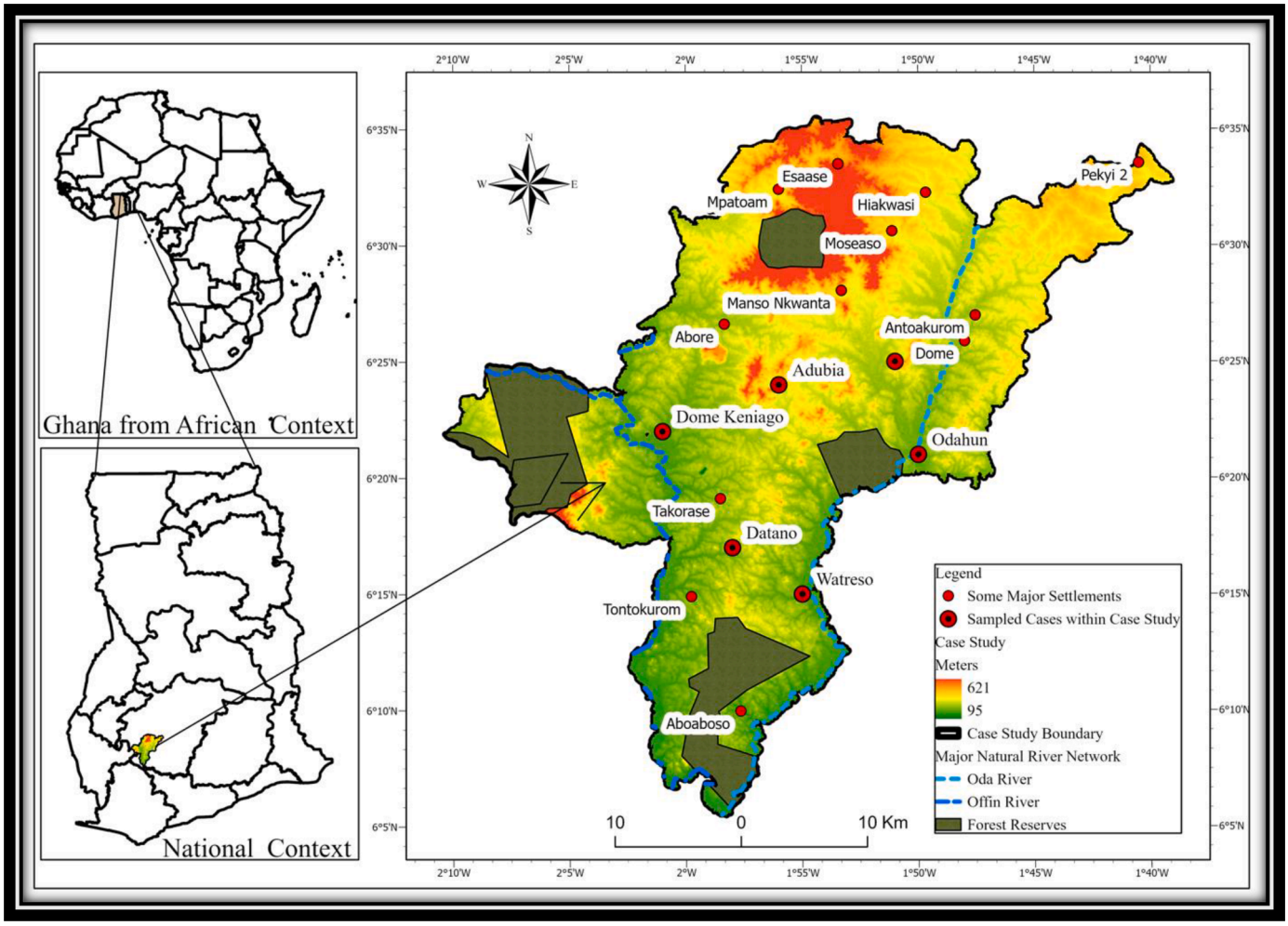
Officer, what they are saying is true. Where we farmed last year, this year they have asked us to go cultivate another place. Definitely the galamsey activities will catch up there too and all our efforts will be futile. We have even planned to go the DCE to come and determine our fate. The forest reserve has been used for galamsey activities now. (R6: FGD_OD002_F)

The statements above highlight the contentious nature of land allocation, land use policies, and natural resource exploitation, as well as the limited influence of state agricultural actors in land access matters. Notably, the local agricultural state actors appeared to adopt a reactive stance in dealing with smallholder land access issues, primarily focusing on implementing government policies like the "Planting for Food and Jobs" initiative, which provided farmers with free or subsidised seedlings without considering their land acquisition methods. That notwithstanding, the District Director of Agriculture noted some modest local-level initiatives, such as the introduction of a cover crop called 'makuna seeds' to restore soil nutrients depleted by illegal mining and the reclamation of degraded farmland for oil palm plantations (KII_M_001_LS).

Moreover, agricultural extension officers, in their capacity, displayed a conspicuous absence of influence and authority concerning matters pertaining to land allocation, acquisition, and negotiation within the context of farming communities. Despite their genuine expressions of remorse for the rapid and relentless displacement of arable lands due to mining activities, they found themselves bereft of any meaningful capacity to intervene in these proceedings. Consequently, they were compelled to relinquish the valuable services they had been providing to the farming populace as soon as these farmers experienced dispossession as a consequence of mining ventures.

The second most significant non-state actor is the traditional authority, consisting of kings and various chiefs. In the case of Southern Ghana, and more specifically the communities within the Ashanti region where this particular case study was conducted, there are three main hierarchies of traditional power: caretaker sub-chiefs called *"Odekuro"* at the bottom, subordinate to a paramount chief who oversees several communities, and finally, the King who serves as guardian of all territories. These traditional authorities have historically implemented customary law and had direct control over the other three non-state actors (Dumett, 1998). During the pre-independence era, for example, an intriguing power dynamic prevailed in Ghana. Traditional chiefs held a significant position, receiving a substantial share of the minerals extracted within their territories. This allocation was accompanied by revenue generated from taxes and obligatory labour (Dumett, 1998). Comparable levels of authority were exercised over smallholder farming. As custodians of the land, the traditional rulers assumed the responsibility of overseeing the distribution of community lands to households and clans, primarily for agricultural pursuits. Furthermore, they enjoyed various privileges such as offerings of agricultural produce and unpaid labour contributed towards their personal farms (ibid). However, colonial capitalism and commercialisation of stool land, as well as post-independence nationalisation of mining activities, have substantially weakened their direct powers (Dumett, 1998; Abdulai, 2017; Bebbington et al., 2018). Nevertheless, an estimated 80 % of all land interests in Ghana are still controlled by customary authorities (Kasanga and Kotey, 2001; MoFA, 2018). Hence, the majority of mining operations, both large-scale and small-scale, as well as agricultural activities, predominantly take place on stool land. In light of the illicit small-scale mining phenomenon, numerous chiefs have faced charges for colluding with illegal miners to perpetuate these unlawful practices (Crawford et al., 2016; Crawford and Botchwey, 2017). They achieve this by allocating stool lands or granting permission for the utilisation of family holdings for illegal mining purposes. It is crucial to emphasise that the occurrence of illicit small-scale mining necessitates the explicit authorisation of chiefs, who serve as custodians of land within local communities. For example, the Mem community in the study serves as a remarkable and atypical instance where the chief has consistently opposed any form of illegal small-scale mining activities—an anomaly within Ghana's mining regions. Furthermore, chiefs have played a significant role in recent instances of land grabbing for commercial agricultural ventures in various districts of Ghana (Boamah, 2014; Cotula et al., 2009, 2014).

The third tier of power belongs to large-scale mining corporations, which have been elevated to prominence by mining reforms that were part of Structural Adjustment Programmes (SAP) initiated in the 1983s in Africa. These reforms aimed to increase the sector's attractiveness to foreign investment and included changes to mining sector legislation, fiscal liberation, privatisation of state mining assets, and environmental laws (Akabzaa and Darimani, 2001) Large-scale mining corporations, owned by foreign investors, have financial, technological, and institutional capabilities that allow them to exert uneven power over small-scale mining firms. This large-scale 'bias' has been suggested as a variable impacting small-scale mining policy in African countries (Hilson et al., 2017; Hilson 2019) and have often resulted in land use conflicts(Hilson, 2002, 2004; Moomen, 2017; Yankson and Gough, 2019). This "bias" encompasses all land uses in mining towns, including agriculture. For instance, fertile land for perennial (cocoa) and other food



Map 2. Map of selected 'cases within Ghana'. Source: Author's Construct, 2022.

crops is "sacrificed" for large-scale mining activities. The widespread bias towards smallholder agriculture was confirmed by a Chief Farmer[3]/Leader of the District Farmers Association and an Assembly Member in this case study as follows:

"The areas which used to be our food basket have all been taken over by the main mining company in this community, Asanko Mines. This area was known as 'buo Kwaku' [literally meaning Kwaku Hills]. This was an area where we harvest the greatest food crops, but Asanko Mines obtained the area as concession …" (ORH_04_AD).

"A greater part of the farming land in this community have been given out to Asanko Gold Mines as a concession. A large part of that land had cocoa on it, but they have all been destroyed" (KII_008_M_LS).

According to their account, the primary mining company in the study district, has taken over the areas that used to be their food basket, where the greatest food crops were harvested.

Small-scale mining institutions and individuals/groups of actors are next in the power structure, and this group is highly heterogeneous, comprising both legal and illegal actors, national and non-national actors, although the subsector is primarily a preserve of citizens. The powers wielded by these non-state actors will be elaborated on in the next section.

In conclusion, smallholder farmers can be categorised into two distinct groups: perennial cash crop farmers (such as cocoa and oil palm cultivators) and food crop/vegetable farmers. These groups, although not mutually exclusive, generally occupy the lowest position within the power hierarchy due to their limited influence and restricted access to crucial natural resources. Despite this overarching vulnerability, an inherent power structure exists among these actors, with peasant food crop farmers holding the least sway primarily due to the promotion of cash crops. The prioritisation of cash crops over food crops (Yaro et al., 2016; Benin, 2019; Mohan and Chiyemura, 2020) has resulted in a diminished power dynamic for food crop producers, who bear the brunt of direct power exertion from other actors. Consequently, they find themselves in a marginalised livelihood trajectory (Adranyi et al., 2023). By exploring the power dynamics among smallholder farmers through the perspectives of indigenous and migrant actors, we can discern that migrant farmers occupy the lowest rung within the power hierarchy, as elaborated in the subsequent section.

The question of how these actors wield their power, and how it impacts their access to land resources, remains a crucial one. In the following section, we shed light on the multifaceted power dynamics that exist between and among these actors and explore the wide-ranging ramifications of these interactions in the light of access to land.

[3] *A Chief Farmer is a renowned farmer with the largest farms and/or highest crop yields and often serves as the mouthpiece/leader of local farmers in a particular town.*

8. Beyond legislation: unpacking land access capability and politics in Ghana's mining and agricultural sector

Land is a finite resource that serves as the foundation for both mining and agricultural activities, and its access and use are governed by frequently complicated and varied legislation and procedures (Kasanga and Kotey, 2001; Hausermann and Ferring, 2018). In Ghana, land access capability is embedded in two broad governing systems, namely the state and customary, which are linked to the multi-scalar and power relation perspectives of political ecology. The state system is governed by enacted legislation at the national scale, which permits the state to acquire land at national and local scales compulsorily by invoking applicable legislation. The customary system, on the other hand, is governed by customary institutions at the local scale, which refer to vested lands belonging to customary authorities, such as stools,[4] skins,[5] clans, and families, or an individual. Customary authorities are estimated to possess over 80 % of land in Ghana under allodial title and are responsible for its allocation, administration, and management (Kasanga and Kotey, 2001; MoFA, 2018).

8.1. Land access capability for small-scale mining

Access to land for mining is heterogenous and influenced by asymmetric power relations among different actors. The access to land for small-scale mining differs among legal and illegal small-scale miners. For registered small-scale mining, an individual, group of individuals, co-operative society or company is issued a mining license for a period of not more than five years, renewable once. This number of years is six times less than the highest initial mining lease awarded to large scale mining corporations and must be awarded to only Ghanaian citizens. However, non-Ghanaians, particularly the Chinese, held such mining licenses, which raises questions about the enforcement of Ghana's mining laws and regulations. The participation of foreign nationals within the small-scale mining sector was attributed to some legitimate concessionaires granting a portion or the entirety of their concession to such individuals or companies. According to a statement provided by a Director at the Lands and Natural Resources Ministry of Ghana, there is supporting evidence regarding the allocation of official permits to unauthorised miners engaged in illegal small-scale mining operations. The Director stated the following:

"Galamsey [illegal small-scale], which involves illegal mining activities, is unequivocally against the [state] law, and it is the responsibility of security agencies operating in the affected districts to prevent its occurrence. However, it is important to note that galamsey presents significant financial opportunities, leading some concession holders to offer their lands to galamseyers in exchange for monetary compensation" (KII_006_M_NS).

Additionally, the involvement of powerful actors in the small-scale mining sector supports the entry of other nationals into the sector. The substantiation of this claim can be traced back to the recent report authored by Professor Frimpong-Boateng, a distinguished figure who formerly served as the Minister of Environment, Science, Technology and Innovation of Ghana and Chair of the Inter-Ministerial Committee on Illegal Mining (Frimpong-Boateng, 2021). Moreover, supporting evidence is provided through a thought-provoking exposé, bolstered by the inclusion of compelling documentary video material (Myjoyonline, 2021). These materials shed light on the unsettling reality of armed military personnel, whose primary role is to protect and secure Chinese miners operating within the Apamprama Forest Reserve which falls within the designated study district. The involvement of powerful actors demonstrates the porous nature of existing mining laws and regulations, on the one hand, and the ineffective monitoring and compliance activities of the state regulators, which are attributed to limited finances, insufficient staffing, technological and logistical constraints, on the other (Haglund, 2008; Mcquilken and Hilson, 2016; Adu-Baffour et al., 2021). These challenges highlight the need for improved monitoring and enforcement of mining laws and regulations.

Compared to large-scale and legal small-scale mining operations, illegal artisanal and small-scale miners acquire land interests through customary law freehold or outright acquisitions. The cost of acquiring land for illicit small-scale mining activities varies depending on the type of land, with cocoa-producing land costing between ¢25,000 (US$4348) to ¢30,000 (US$5217[6]) per acre and wetland areas costing between ¢ 7000 (US$1217) to ¢10,000 (US$1739) per acre. Compensation for farmlands containing food crops is lower, and individuals with lesser land interests, such as those under customary tenancy agreements, often receive little or no compensation for destroyed crops. In *Manso Adubia*, a smallholder farmer articulated his concerns regarding the situation as follow:

"The land that was sold for galamsey was previously utilised for cultivating plantain (Musa paradisiaca) and cassava (Manihot esculenta). I must emphasise the remarkable productivity of the cassava crop, which unfortunately fell victim to the destructive actions of the illegal miners. Although they were obligated to compensate me for the decimated crops, their payment was woefully incomplete. Conversely, they promptly remunerated my family in full for the land, enabling us to construct a residence in Manso Nkwanta" (SSI_AD005_M_FM).

This highlights the complex nature of the issue, where monetary compensation for crops does not necessarily reflect the true value of the loss experienced by farmers. Notwithstanding the wealth generation resulting from the operations of small-scale mining within this household, the agricultural sector, and specifically this farmer who occupies a marginalised livelihood trajectory and possesses limited influence within both the family structure and the mining community, bore the brunt of the consequences. In terms of his position within the family, this farmer lacked agency in determining the utilisation of the land. The elders of his family made the decision to sell the land for small-scale mining, leaving him powerless to alter or exert any influence over this outcome, ultimately leading to the forfeiture of his means of subsistence. The prevalence of this phenomenon was widespread among a multitude of farmers who opted to cede their land to small-scale mining operators. Its occurrence was largely contingent upon the methods employed to acquire land for agricultural pursuits, a topic that will be expounded upon in the subsequent paragraphs of this section.

Additionally, financially impoverished young men and elderly women may participate in the illegal small-scale mining sector through customary tenancy agreements, paying daily rentals ranging from ¢100 ($17) to ¢200 ($35) to landowners for access to already mined areas. Other customary tenancy agreements may involve a wealthy sponsor acquiring land and vesting it in a group of young men, who extract gold from the land and sell it to the sponsor at a rate specified by him. To maintain compliance, a paid representative of the sponsor is always present at the mining site. These diverse customary tenancy agreements highlight the complex and varied nature of the small-scale mining sector, with a strong proclivity for capital accumulation through skewed revenue sharing arrangements and the marginalisation of certain actors, particularly young people with limited access capabilities. Similar observations have been made in Tanzania, the Philippines, and Zimbabwe (Fisher, 2007; Verbrugge and Besmanos, 2016; Mkodzongi and Spiegel, 2019). The subsequent section delves into the land access capabilities pertaining to farmers.

[4] *Stool represents the symbols of authority of chiefs in the southern parts of Ghana*

[5] *Skins represent the symbols of authority of chiefs in the northern parts of Ghana*

[6] *¢ is the cedi symbol, which represents Ghana's national currency. The dollar symbol $ symbolises the national currency of the United States of America. The cedi's US dollar equivalent is calculated using the GHC1 to $5.75 exchange rate as of February 2021, with figures rounded to the closest whole number.*

8.2. Land access capability for smallholder farming

In this case study, similar to many countries in sub-Saharan Africa, access to land for smallholder farming primarily relies on customary arrangements. The majority of farmers interviewed in this study (approximately 71 %) obtained their current landholdings through usufruct, particularly through inheritance from a family member. This represents the main source of land interest in smallholder farming in Ghana, with indigenous people holding most of the land. Additionally, 23 % of farmers retain land rights through customary tenancy arrangements. Many of these agreements involve sharecropping or caretaking, while only a few vegetable farmers acquire land interests through leasing agreements.

Contractual arrangements for sharecropping are prevalent in agricultural areas and typically involve a partnership between native allodial title holders and migrant farmers. However, in recent years, these relationships have extended to interactions between two indigenous peoples, especially when one desires more farmland due to land fragmentation caused by population growth. Under this model, migrant farmers are granted an interest in land for farming, supported by flexible contractual arrangements. The majority of these arrangements entail the landowner receiving a specified percentage of the farm's produce. There are two distinct sharecropping systems observed: *'abunu*' and *'abusa'* (KII_006_M_NS). The *'abusa'* method involves one party providing their land for another to farm without contributing to farm management. When the farm produce is sold, the landowner receives one-third of the proceeds, while the farmer receives the remaining two-thirds. The *'abunu'* method requires the landowner to offer their land to another individual and contribute to its development. In this case, the revenues from the farms are split equally, with a 50:50 distribution. Within the context of land use competition, these various types of land interests create opportunities for multiple unequal power dynamics and exploitation of migrant farmers (Nyantakyi-Frimpong and Bezner Kerr, 2017).

Furthermore, the study revealed that only a small percentage (6 %) of the farmers that participated in the study owned customary freehold interests in land, obtained through outright acquisitions of cash crop farming. Throughout the study district and Ghana as a whole, outright purchases of land for smallholder farming activities are rare. This is primarily due to the limited disposable income among most farmers, making it difficult for them to afford such land holdings. However, a few established farmers who engage in other businesses including small-scale mining take advantage of financially distressed farmers who are compelled to sell their farms or properties to meet immediate demands or overcome financial troubles. In his testimony, a farmer with ownership of 17 hectares of farmland, affirms that established farmers occasionally acquire farmland directly from those facing hardships. He states:

"In this community, some farmers go through hardships which forces them to sell their land. Being a transport owner, I can buy some of such lands" (SSI_D03_M_FM).

The above statement highlights the exploitation of vulnerabilities among certain farmers regarding their land interests. It is important to note that these vulnerabilities are not only exploited by affluent farmers but also by affluent miners and farmer-miners who often offer more favourable rates, thereby gaining priority when competing for such land holdings. This challenge, coupled with various other issues, poses difficulties for smallholder farmers, particularly migrant farmers, in acquiring new or additional land for farming. This difficulty is reported by 72 % of interviewed farmers and is further substantiated by key informants and participants in select focus groups.

8.3. The power dynamics among key actors in small-scale mining, large scale mining and smallholder farming

The intricate power dynamics among state and non-state actors within the mining and agriculture sector, specifically pertaining to access to land, can be comprehended and elucidated by examining land negotiations, acquisitions, and compensation. This section aims to delve deeper into these aspects by shedding light on the case study of Ghana, providing valuable insights.

During the process of land negotiation, acquisition and compensation for mining purposes, the state's disproportionate power is utilised to favour well-established mining institutions operating on a large scale, as well as registered small-scale mining entities. However, this preferential treatment comes at the expense of other actors, particularly smallholder farmers. This deduction is made based on the observation that the state typically grants mining rights to these two categories of actors, with minimal or no consideration for the current land users, as long as the land in question does not intersect with existing mining concessions (Hausermann et al., 2018).

For large-scale mining operations, encompassing extensive land areas ranging from 21 to 132,300 hectares, typically owned by a variety of stakeholders including individuals, families, or the local governing body, formal recognition is given to existing land users, and compensation is streamlined and mediated by a committee to arrive at "fair and adequate compensation" as defined in compensation regulations (Government of Ghana, 2012). Based on information provided by a key informant from the Ministry of Land and Natural Resources, existing land users, mainly farmers, have options for compensation, including 'equal reinstatement', where they are placed on land comparable to what they are losing and compensated for the hardships created, or an agreed-upon sum of money, commonly referred to as a 'disturbance payment'. Alternatively, in certain cases, landowners are exclusively remunerated with a prearranged sum of money, allowing them the autonomy to decide how they wish to allocate and utilise these funds (KII_006_M_NS). The latter approach was found to be prevalent within the study district.

According to a key informant and a distinguished member of the compensation committee, the current level of compensations appears inadequate considering the projected duration of farmers' reliance on their farms[7] (ORH_04_AD). Echoing this sentiment, another key informant, who holds a prominent position within the District Farmers' Association, expressed a comparable apprehension by highlighting that the concentrated disbursement of funds as compensation led to the mismanagement and subsequent impoverishment of a considerable number of farmers" (KII_008_M_LS). The key informant emphasised that a significant number of farmers are now in a state of 'misery', as they have permanently lost their lands while depleting their compensation. These narratives were not only confined to smallholder farmers or families affected by large-scale mining but also extended to those impacted by small-scale mining. However, it is important to note that there have been notable cases of success, wherein farmers or families have effectively utilised their compensation to engage in constructive endeavours, such as residential construction. These instances further substantiate the claims made by Hilson and Hu (2022) regarding small-scale mining's potential as a catalyst for generating wealth. Overall, the power dynamics at play in land negotiation and acquisition for small-scale mining highlight the need for equitable compensation and a more inclusive decision-making process that considers the interests of all actors involved.

In theory, the streamlined acquisition and compensation mechanisms for large-scale mining operations should also apply to small-scale mining allocations. However, in practice, informal negotiations and acquisitions between mining license holders and existing land users are more common (Hausermann et al., 2018). This may be because small-scale mining concessions are often granted on smaller parcels of land belonging to a few individuals or families. As a result, individuals claiming to have been granted mining permits often come to study communities without alerting current landowners and requesting that

[7] *Farms with cocoa can continuously yield fruits for over 30 years.*

they vacate their property to allow for mining operations. In one of the study communities, an Assembly Member reports a concerning trend where established land users are experiencing the loss of their farmlands to small-scale miners who assert to have obtained concessions for those lands. The Assembly Member highlights the situation by stating the following:

"We had people coming from Accra [national scale] with papers [purported mining licenses] that they have been granted a concession to mine by the Minerals Commission. People came from Accra, Takoradi and Tema that they have been granted a concession by the Minerals Commission to mine. People [farmers] had no choice but to sell their lands given out for concession. Even when you refuse to sell, you get calls from the elderly and reputable people from the community to sell. Those who share boundaries with concession lands also have no choice but to sell their lands because, with the mining activities, all the underground water goes into the mining pit leaving the crops with no water to thrive. The chief here does not even have much to do because the people come with genuine concession papers from Accra" (ORH_02_DT).

The prevailing operational approach described above sharply diverges from the stipulations set forth in state laws, specifically the Minerals and Mining Act 2006 (Act 703) and the Minerals and Mining Licensing Regulations 2012 (L.I. 2176). The Minerals and Mining Licensing Regulation for example dictate that once an application is accepted by the Minerals Commission and duly recorded in the Priority Register by the Minerals Title Department of the Minerals Commission, it must be formally published in the Gazette. Simultaneously, a copy of this application notice must be disseminated to the relevant chief, traditional authority, or landowner, as well as the pertinent District Assembly. Among its multifaceted provisions, the regulation specifies that these notices should conform to local customs and practices of the area in question. Moreover, they mandate that copies of these notices must be conspicuously posted on the land subject to the application. Furthermore, a procedural framework is established for owners or lawful occupants of the affected land, allowing them to submit a written statement of their vested interests within 21 days of the notice's publication in the Gazette.

The stark reality, however, paints a contrasting picture. For most landowners or occupants, their first inkling of their land's allocation for small-scale mining arises when the concessioner has already been granted the concession and is poised to commence operations, as attested by the Assembly member. This poignant revelation underscores the dwindling capacity of current landowners and users, who predominantly comprise smallholder farmers, to have a say in relinquishing their land or farms for mining ventures. Additionally, one can discern the restricted authority wielded by traditional leaders, namely chiefs, in relation to the state regulatory body. Traditional leaders and authorities are merely apprised of pending applications for small-scale mining licenses and possess limited influence over the decision-making processes governing these awards. This attenuation of power among traditional authorities regarding mining license awards occasionally leads to the exertion of their agency through participation in illicit small-scale mining activities. In this clandestine domain, they wield direct influence over land allocation and pricing, thereby underscoring the complexity of the interplay between traditional and state authorities in the realm of mining activities.

Moreover, the state's overwhelming powers in relation to smallholder farmers and traditional authorities can occasionally lead to conflicts. Within the Watreso community, an Assembly Member shed light on a prevailing discord between local farmers and a Spanish mining enterprise that had obtained a mining permit. This conflict prompted the intervention of the Minerals Commission of Ghana, which underscored the authority of the state as the proprietor of all mineral reserves, emphasising its relationship with the land rights held by farmers (ORH_02_DT).

Our research uncovered a secondary modality of land negotiation and acquisition that operates within the realm of state dominance. This particular practice resides in a grey area, occupying the ambiguous space between informality and illegality. Moreover, it occasionally thrives on the principle of 'survival of the fittest'. Numerous individuals, families, and occasionally traditional authorities relinquish their land interests for unlawful small-scale mining activities, driven by economic hardships, coercion from influential non-state actors, and a yearning to exert autonomy in opposition to the overwhelming authority of the state. Notably, the study found that these land interest alienations for illegal small-scale mining activities were both voluntary and involuntary in nature. During a focus group discussion, a farmer, exemplified the voluntary surrender of land interests for illicit small-scale mining, expressing:

"Many landowners have sold their land for galamsey activities. They were not forced by the government to do so. … I have personally sold my land too for galamsey and spent the money" (FGD_OD02_CFM).

This voluntary transfer of land interest for illicit small-scale mining was reiterated by a key informant as follows:

"I know a farmer who has refused to sell his cocoa farms despite all the people he shares boundaries selling theirs. Frankly, the farmers are not forced to sell their farmland. They sell them voluntarily when they consider the bulk of the money, they will get which they can never get from their farms" (KII_009_M_LS).

The act of voluntarily relinquishing land rights for the purpose of small-scale mining primarily occurred among individuals following a trajectory of livelihood consolidation (Adranyi et al., 2023). This phenomenon reveals the complexity and challenges of small-scale mining in Ghana and underscores the need for improved regulatory frameworks to protect the rights of smallholder farmers and traditional authorities.

The study findings highlight the phenomenon of voluntary alienation of land for illegal small-scale mining activities, with wetlands being the initial targets due to their mineral resources, lack of support for perennial crops such as cocoa, and proximity to water sources for ore washing. However, with the depletion of mineral deposits in wetlands, farmlands became the next targets for illegal mining activities. The process of land alienation was carried out through various means, including exploration of mineral reserves on farms without notifying farmers, negotiation with willing landowners, and forceful or persuasive tactics to sell land to illegal miners. Farmers who did not sell their land suffered from the negative impacts of illegal mining activities, such as damage to farms by mine water and restriction of access routes by mining trash. The use of persuasive tactics by illegal miners, such as alerting farmers of the threats their activities posed to their farms, also played a role in land alienation for illegal mining. A concerned farmer residing in *Watreso* expressed apprehension regarding the potential loss of his land due to illicit mining activities after all the farms neighbouring his were sold to Chinese miners. He stated as follows:

"I used to have some cocoa farm in a low-lying area. It was doing very well because of the water body and all-year-round moist nature of the land. However, some Chinese miners bought all the lands I share a boundary with and only my land was left, so I had to sell also. If I do not sell, my cocoa will die because when they dig their pit, all the underground water moves into it depriving the other crops of water. If you do not sell, all the cocoa will die. But for this, I would never have sold that cocoa farm. I had very good high breed cocoa on it [land alienated]. When they started buying the lands around that area for mining, we observed that those who didn't sell theirs had their cocoa dying" (SSI_W07_M_FM).

Remarkably, the farmer recounted how illegal miners occasionally employed persuasion tactics to convince landowners to relinquish their land rights for illicit mining purposes. In his observations, he made the following noteworthy points:

"The Chinese man mining that area even told me that if I do not sell my land to them and they go, my cocoa will still die. Some who refused to sell had their cocoa dying. Some even regretted not selling. The Chinese man explained to us that they dig deep into the earth and so all

the water in that area moves into their pits and thus our cocoa will not have enough water to thrive. Even when it rains, it drains into their dug pits" (SSI_W0_M_FM).

During a focus group discussion in Odaho, another farmer provided an example of how the deliberate pumping of mining wastewater onto their farmland caused them to lose interest in the land for illegal mining. The farmer detailed the subsequent objections:

"We have our crops on it [farmland] and my wife had even gone there to harvest some tomatoes just some few days. We went there after a few days only to observe that the galamsey activities ongoing in a nearby land have splashed their pit water on our farm. When this happens, the crops are not able to do well again so I had to sell the farmland" (FGD_OD02_CFM).

The above narratives provided by farmers serve as concrete examples that illustrate a prevailing mindset prevalent among individuals in the farming community who have experienced the unfortunate loss of their farms or farmlands due to illegal small-scale mining activities. These accounts shed light on how smallholder farmers, driven by a combination of fear, subtle pressure, and persuasive tactics employed by illegal miners, ultimately relinquish their rights and interest in the land.

Based on the experiences shared by these farmers, it becomes apparent that certain individuals with limited stakes in the land, such as sharecroppers, caretakers, or those who merely rented the land, are disproportionately impacted by the allure of selling their farmland for the purposes of illicit mining. This observation reinforces the notion that individuals with lesser vested interests in the land are particularly vulnerable to the detrimental consequences of land appropriation for small-scale mining activities. To further illustrate this point, a specific account provided by a sharecropper residing in Watreso, provides compelling evidence:

"I once cultivated 3.7 ha of cocoa farm, but the owner of the land has made us sold it to be used for galamsey. The money he gave me from the sale is finished as I used it to pay for my children's school fees. …. It was the owner of the land who decided to sell it. I tried convincing him severally not to, but he still insisted and was convinced by his nephew and sister to sell. This owner likes quarrelling and if I had not agreed for the farm to be sold, I am very sure he would have still gone ahead without me receiving my share of the proceeds from the sale. Moreover, our land was the last land in that area to be sold for galamsey. All other lands sharing boundaries with us were already sold" (SSI_W002_M_FM).

The preceding narrative aptly illustrates the inherent vulnerability endured by individuals possessing meagre land holdings, compounded by the distressing exploitation endured by labourers at the hands of certain farm owners. These exploitative inclinations are further exacerbated by the mounting clamour for land allocation in support of small-scale mining operations. Furthermore, the consequential ramifications stemming from the surge in demand for land dedicated to small-scale mining activities are evidenced by the palpable erosion of agricultural livelihoods. This highlights the complex interplay of factors that drive land alienation for illegal small-scale mining activities, and the detrimental impacts of such activities on land use and livelihoods.

9. Conclusions

This paper undertakes a thorough analysis of the intricate and multifaceted politics and capabilities surrounding land resource access at the crossroads between mining and agriculture. To shed light on the complex power dynamics and relationships among the key actors involved in the mining and agricultural subsector, our study draws on a combination of political ecology theory and the capability approach. Viewed through the lens of political ecology, our investigation has brought to light the intricate web of power dynamics shaping land access at the juncture of mining and agriculture. Our study has illuminated the unequal power distribution, showcasing the substantial authority vested in state actors, particularly those within the mining sector, with regard to land access. At times, these powers of the state actors within the mining sector even eclipse those of other agricultural state actors operating at mining and agriculture intersections. The disproportionate influence wielded by the state engenders tension and conflicts among various stakeholders in both the mining and agriculture sectors, notably among small-scale miners, small-holder farmers, and traditional authorities. Drawing from the capability approach, we have discerned diverse agency-driven strategies employed by non-state actors, which, on occasion, transcend existing legal frameworks. For instance, our research has unveiled the competitive inclinations among small-scale miners and small-holder farmers when vying for land resources to support their respective economic endeavours. These competitive tendencies occasionally hinge on principles such as 'survival of the fittest', voluntary arrangements, and even coercion, often leaving small-holder farmers with limited land holdings at a distinct disadvantage in this complex process. We therefore argue that the spatial and socio-economic interconnectedness of mining and agriculture is rife with dramatic tensions underpinned by unequal power relations and a hierarchical structure of actors within the two sectors, with potential for zero-sum or worse than zero-sum outcomes for humans and the physical environment at multiple scales.

Based on the empirical findings, we highly recommend that a coordinated approach among state institutions within the mining and agriculture sectors is needed. Particularly, policies and their implementation need to be coordinated to effectively address the multifaceted nature of these sectors. Furthermore, a systematic delineation of land for distinct land uses is crucial in order to deter the arbitrary conversion of land for unplanned purposes. Finally, the comprehensive formalisation of the small-scale mining sector will play a pivotal role in streamlining the processes of land negotiations, acquisition, and compensation. This endeavour undoubtedly demands a holistic approach that considers the agricultural sector and its specific requirements.

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