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Analysis of spatial interactions between the Shea industry and mining sector activities in the emerging north-west gold province of Ghana

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ABSTRACT

The spatial interactions between valuable trees and large-scale mining sector activities provides risks and uncertainties on rural economic livelihood. This generates public clamour and resistance to mineral resource development in developing countries. Hence, this paper analyses the spatial interactions and magnitude of the impacts of large-scale mining industry activities on the Shea as an economic tree. A case study is conducted at the emerging north-west gold province of Ghana. Both primary and secondary data were obtained during two fieldworks. Whereas there is a robust Location Association (La)=70 between a Shea-led manufacturing industry and the wholesale and retail sector, a weak location association is found with mining and quarrying, and the manufacturing sectors. The associated industries are inter-dependent for inputs from the Shea tree, though the spatial analysis reveals that a minimum of 22,460 Shea trees and 806,407 kg of fruits would be displaced. The displacements would affect both manufacturing and wholesale and retail sectors, basically dominated by rural women. Albeit, the findings of the study can improve the levels of communication between local communities, mining companies and governments.

1. Introduction

Large-scale mineral resource development is one such a high-stakes industry that has received global resistance[1] over the years. Anyhow, resource creation remains significant to the economic and physical development of both developed and developing countries. Accordingly, it requires the simultaneous occurrence of four factors: natural endowment, cultural appraisal, demand, and human capital (Roy, 2007). Although mineral resource endowment is regarded as an asset to national economies, its development is touted as a nuisance to rural livelihood since the basic needs of most rural communities is grain and meat (Downing and Garcia-Downing, 2009). These variations over the recognition of community needs, allocations and use of natural resources lead to resistances and conflicts. For case in point, rural areas harbour most countries natural resources including large land sizes, fertile soils, vegetation, and mineral deposits. However, large tracts of rural lands are often granted for mineral resource exploration and mining. These activities sometimes lead to violent conflicts, especially, in areas where large-scale mining is perceived to have negative impacts on local communities and ecosystem good.[2] These issues are increasingly common in mineral resource-rich developing countries (Hilson, 2002). Communities may block access to exploration and mining activities, or resist through public protests and the media (Boutilier et al., 2012; Resosudarmo et al., 2009).

In this regard, Wunder (2005) posits that political and social realities exacerbate the conflicts. These include: compulsory acquisition of land by governments, land privatisation; marginalisation of traditional rulers, weakened customary property rights, and rising social movements against mining (Bebbington et al., 2008; Tsuma, 2010). The conflicts may deny communities access to downstream investment opportunities, incomes, and infrastructure that would accrue from the mining sector (Bloch and Owusu, 2012). Importantly, Davis and Franks (2011) find that mining companies lose a minimum of 45% of operations time

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[1] Resistance to resource development is any activity or action or a circumstance that inhibits resource exploitation (Roy, 2007).

[2] Ecosystem goods refer to the absolute availability of land, vegetation, animal and water having socioeconomic value for humans (Nachtergaele et al., 2010).

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through conflicts with communities. Consequently, governments lose tax revenues and royalties. Nevertheless, Twerefou (2009) identifies the distribution of royalties, land use, resettlement, and small-scale mining as major areas of company-community issues. However, Hintjens (2000) finds that land use disputes are the overarching company-community conflicts. Thus, Jenkins (2004) identifies that physical and livelihood displacements[3] are central to mining-related land use conflicts. In this context, Ellis (2000) describes rural livelihood activities as economic and non-economic. Non-economic rural livelihood includes the social relationships and institutions that mediate the allocation and use of community's lands and its resources. Economic rural livelihood is diversified and comprises of On and Off-farm agriculture; and non-farm activities (Ellis, 2000).

The World Bank (2005) adds that non-farm rural livelihood is an important factor for poverty reduction in developing countries. For example, about 30–50% of household income in Sub-Saharan Africa, and up to 80–90% in Southern Africa, is derived from non-farm economic activities (Ellis, 2000). Mostly, off-farm livelihoods such as the wholesale and retail sector are derived from agricultural and tree products, and are ran by rural women (Marchetta, 2011). It is estimated that about 60–70% of rural folks in Ghana earn an economic livelihood through tree products (Obeng et al., 2011). One famous tree of high economic value is the Shea. The Shea's associated industries provide a primary source of income for rural women in Sub-Saharan Africa (Schreckenberg et al., 2006). For instance, about 95% of rural women in the Northern Savannah areas of Ghana engage in the Shea industry (Hatskevich et al., 2011). Meanwhile, in Ghana, exploration and mining activities are linked with displacements of trees with economic value (Schueler et al., 2011). This occurrence affected the trade and livelihood of women in the Tarkwa mining area of Ghana (Akabzaa, 2000). Hence, Joyce and Thomson (2000) posit that the previous experience of people influence their resistance to mining projects.

To manage the increasing mining sector land use conflicts; governments, the mining industry and scientific community have developed various tools. These include: legislative and regulatory policies, customary tools; Corporate Social Responsibility (CSR), Social License to Operate (SLO); Social Impact Assessment (SIA) and environmental analysis (Hilson, 2002, 2012; Owen and Kemp, 2013; Slack, 2012). Notwithstanding, the industry remains confronted with land use conflicts because, these mechanisms herald flawless cooperation among the various land use interest groups, which is non-existent (Catherine and Andrew, 2012). Hence, it is imperative to identify potential areas of company-community conflicts at the planning stages of exploration activities (Cernea, 2003; Joyce and Thomson, 2000).

To this end, the application of existing techniques for predicting and mitigating land use conflicts could be useful. These techniques include the LUCIS Model (Carr and Zwick, 2007), the MEDUSAT Model (Joerin et al., 2001), and Compromise programming models (Eastman et al., 1993). However, these models often entail standardisation and criteria weighting, upon which spatial suitability of competing land uses is analysed and prioritised solutions are developed. Therefore, the methods are normative and often involve mathematical algorithms that can be complex to local communities (Madani and Lund, 2011). Such complex methods accentuate existing structural inequities between local communities, the mining sector and government (Owen and Kemp, 2013).

Even so, Obara and Jenkins (2006) suggest that mining-induced displacement and land use conflicts can be addressed by examining the specific causes in isolation rather than in a holistic approach. Thus, systems engineering approach (Craynon et al., 2015), discrete choice experiments (Que et al., 2015), and aggregate complaints analysis (Moran and Brereton, 2013) have been tested for predicting potential resistance to new mining projects. However, these approaches stop short of capturing the links between local communities' land use objectives and the set of livelihood activities that do not directly depend on land. Examples include the wholesale and retail sector, which derives its input from treasured trees such as the Shea. Therefore, this study adopts non-cooperative gaming[4] technique for modelling the potential economic–livelihood displacement of mining communities (Boutilier et al., 2012). The approach provides practical framework for handling multi-criteria, multi-objective and multi-decision-maker problems (Madani and Lund, 2011). It permits the simultaneous analysis of socioeconomic and environmental issues linked with the mining sector (Craynon et al., 2015). The approach is also relevant for predicting potential land use conflicts between the mining industry and local communities, considering a non-cooperative behaviours of both (Moran and Brereton, 2013; Que et al., 2015).

Thus, the study maps and analyses the spatial interactions between Shea trees and the mining industry activities (exploration/mining concessions); allowing for spatial interpretation of potential conflict areas. Hereafter, it identifies the location affinity between the Shea industry (herein categorized as manufacturing), mining and quarrying, and the wholesale and retail industries. That is where a displacement of the Shea industry may have rippling effects on other parts of the local economy (Moran and Brereton, 2013). The study further illustrates the potential impacts of Shea displacement on already vulnerable rural women in the event of mining. The scope of this study is novel in a burgeoning literature concerned with corporate community land use conflicts in developing countries. Not many other studies have considered a displacement of the Shea industry, by large-scale mining sector activities, as a major source of corporate community conflicts as ours does.

2. Materials and methods

2.1. The study area

Ghana leads in gold production in West Africa and second in Africa (Mines, 2013). It also hosts substantial deposits of aluminium, manganese ore, bauxite and diamond (Coakley, 1996). Politically, Ghana has been divided into 10 administrative regions. The Northern, Upper East and Upper West Regions are the three in the north.

Historically, Ghana's mineral concessions were concentrated in the southern regions of the country. But, with recent discoveries of world-class gold deposits, plans are far advanced to start large-scale extraction of gold in the Upper West Region (Azumah Resource Limited, 2013). This development warrants this paper to explore a case study in the area (Fig.1). Upper West, with Wa as its regional capital, is the second poorest region in the country (GSS, 2007). Nevertheless, the economic contribution of the Shea industry to the livelihood of households in this region cannot be underestimated (Yidana, 2004). Thus, Shea trees constitute about

[3] Physical displacement involves the overall relocation of settlements and livelihood from their current occupancy to a different location (Cernea, 2000). It also involves reductions or loss of quality and quantity of environmental resources such as ecosystem goods. Economic or livelihood displacement entails the imposed or induced loss of assets, and income on the affected local communities ibid., Downing (2002).

[4] The Game theory is a study of conflicting multiple objectives where each player's decisions and actions potentially affect the interests of the other players (Madani and Lund, 2011).