



The relative importance of climate change in the context of multiple stressors in semi-arid Ghana



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ABSTRACT

This paper investigates the relative importance of climate change in the context of multiple stressors in semi-arid Ghana. It draws upon ethnographic research in two agrarian villages, and integrates theories from resilience, vulnerability and feminist political ecology. The findings empirically demonstrate that many farmers do not worry about climate change, even in situations where local perceptions and the climate data show a clear pattern of variability. Additionally, the paper provides evidence of a 'gendered double exposure,' whereby patriarchy and local culture shape how different social groups are impacted by climate change. Overall, the emerging findings suggest that an overemphasis on scenario-based climate change impacts may detract attention from equally important non-climatic factors that loom large in people's lives. The article's central argument is not meant to downplay the ongoing impacts of climate change in Africa. It rather suggests that climate change should be addressed as one problem among many socio-ecological challenges facing smallholder farmers.

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1. Introduction

Global climate change is recognized as one of the greatest threats to smallholder farming in sub-Saharan Africa. In the Sahel and savannah parts of Africa in particular, climate scientists have shown that extreme temperatures have increased, while precipitation has also reduced over the last fifty years (Niang et al., 2014; Seneviratne et al., 2012). The Intergovernmental Panel on Climate Change (IPCC) projects that these changes will intensify in the coming decades, with variations across countries, but overall negative effects on agriculture and food security (Niang et al., 2014). Under climate change, it has been projected that many areas in sub-Saharan Africa will experience truncated growing seasons (Sarr, 2012; Niang et al., 2014). By the year 2050, food crop yields could be up to half of current levels (Roudier et al., 2011; Sultan et al., 2013). There is further evidence suggesting that poor smallholder farmers are those who will be most vulnerable to the adverse impacts of climate change (Harvey et al., 2014).

While climate change can affect farming systems, however, "a focus on climate-risk alone does not enable a full understanding of the host of factors that combine to configure risks and heighten vulnerability to periods of climate stress" (Reid and Vogel, 2006, p. 196). In many agrarian settings, climate change is only one of the factors shaping farming systems, and might not even be the most important stressor (Eakin, 2006; Leichenko and O'Brien, 2008; Reid and Vogel, 2006). In addition, marked differences exist among social groups (e.g., gender, age, culture, class) when it comes to how severely their livelihood systems are affected by climatic changes. A small but growing body of work is emerging to examine the differentiated impacts of climate change, as well as the relative importance of climatic and non-climatic stressors (Arora-Jonsson, 2011; Carr, 2008; Djoudi and Brockhaus, 2011; Nielsen and Reenberg, 2010; Tschakert, 2007; Onta and Resurreccion, 2011; Vincent et al., 2010). This paper seeks to make an empirical contribution to this emerging literature.

The main objective of the study is to explore the relative importance of climate change in the context of multiple stressors in semi-arid Ghana. More specifically, we ask: (1) what factors do farmers identify as most relevant for climate change resilience and adaptation, and how do these factors differ by gender, age and kinship relations? (2) How important is climate change as compared to other factors that shape smallholder farming and

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food security? We investigate these questions by adopting a feminist political ecology framework (Rocheleau et al., 1996), integrated with theories of vulnerability and resilience (Adger, 2006; Folke, 2006), and indigenous environmental knowledge (Boillat and Berkes, 2013; Orlove et al., 2010).

Using village-level ethnographic data, we empirically demonstrate that climate change is not of acute concern among some social groups of farmers, even in situations where local perceptions and meteorological data show clear patterns of climate variability. Compared to climate change, we find that intra-household property rights, liberalized markets, and insecure land access are more critical challenges for farmers. Our findings are not intended to downplay the threats posed by the ongoing impacts of climate change in Africa. Rather, we seek to bring to the fore cultural, gendered and political economic dynamics that loom equally large and intersect with climate change to shape smallholder farming (Carr, 2011; Eakin, 2006; Leichenko and O'Brien, 2008; Nielsen and Reenberg, 2010; Tschakert and Machado, 2012; Vincent et al., 2010). Our findings further suggest that many farmers are resorting to local knowledge and innovations to limit the impacts of climate change. The effectiveness of these innovations, in part, explains why farmers do not worry as much about climate change, but rather, focus on the non-climatic factors over which rural communities have little control.

The paper is organized as follows. In order to set the context for understanding how significant climate change is perceived to be, we first discuss the political economy of agriculture and food security in northern Ghana. We then present our theoretical approach and give a description of the research villages. Next, we describe our methodology before presenting the research findings, which are organized into three key parts. The first part is a comparison of the long-term meteorological data and farmers' perceptions and ideas about climate change. The second part reveals how different gender- and generational-based groups evaluate the relative importance of climatic and non-climatic factors. Finally, we demonstrate the dynamic and innovative quality of indigenous agricultural practices, including soil and water conservation techniques, and the complex calibration of crop sequencing. We assess the limits and logic behind these practices, especially how each is selected on the basis of seasonal material needs, household composition, and labour availability. We conclude by highlighting what our findings mean for climate change resilience and adaptation in Africa.

2. A brief political-economic context of the study area

Semi-arid northern Ghana remains a great paradox on virtually every front. More than 80% of the population is engaged in agriculture (Ghana Statistical Service, 2013); yet, one in every five persons is food insecure, while one in every nine children dies of malnutrition before age five (Biederlack and Rivers, 2009). Particularly striking is the fact that subsistence-oriented food crop farmers are those who suffer from chronic malnutrition and food insecurity (Biederlack and Rivers, 2009). The region is also mired in abject poverty. The Ghana Statistical Service estimates that in the northern parts of the country, poverty rates are two to three times higher than the national average (Ghana Statistical Service, 2013). Three major reasons are common in the literature that seeks to explain this geographical inequality in poverty, food insecurity and malnutrition in Ghana. These reasons include recurring droughts or climate variability, British colonial rule, and neoliberal development policies (Nyantakyi-Frimpong and Bezner Kerr, 2014; Rademacher-Schulz et al., 2014; Songsore, 2003; Yaro, 2013). Northern Ghana falls within the southern fringe of the West Africa Sahel. The region therefore experiences severe droughts and climatic variability, with important implications for agriculture

and food security (Rademacher-Schulz et al., 2014), as the results section of this article will show.

British colonial rule (from 1874 to 1957) placed different parts of the Gold Coast (now Ghana) on a particular development trajectory (Songsore, 2003). While the coastal areas of the Gold Coast were firmly established as a British colony and protectorate by 1874, the Northern Territories were not annexed until September 1901. The late annexation was due to limited opportunities for export crops and mineral wealth (Songsore, 2003). While the colonial government supported intensive infrastructural development in southern Gold Coast, the Northern Territories remained neglected and were treated as a source of labour for export-oriented economies in the south. Northerners had to travel south to earn an income to pay the colonial taxes. This development established persistent patterns of migration which have continued up to the contemporary period (Rademacher-Schulz et al., 2014). After independence in 1957, state policy and planning continued to embrace the same regional bias, thereby perpetuating the spatial disparity in development. Immediate post-colonial state policies favoured the extraction of natural resources. Thus, with low resource endowments, little government revenue flowed into the north, thereby resulting in limited transport and marketing infrastructure, input and credit availability, agricultural extension, and other rural services (Songsore, 2003; Yaro, 2013).

Around the late 1970s, oil price hikes, severe droughts, persistent budget deficits, expansionary fiscal policies, and excessive borrowing plagued the Ghanaian economy (Hutchful, 2002; Konadu-Agyemang, 2000; Pearce, 1992). Similar to other African countries, the Ghanaian government sought relief by negotiating for an economic recovery loan of \$1.4 billion from the World Bank and International Monetary Fund (Pearce, 1992). The loan came with several conditionalities, which were the standard features of structural adjustment programs (SAP). More than any other sector in the Ghanaian economy, agriculture saw the most radical restructuring (Hutchful, 2002). Noteworthy among structural changes included the removal of subsidies for fertilizers, seeds and insecticides. The government further retrenched agricultural extension services and dismantled marketing boards that serviced smallholder input requirements (Hutchful, 2002; Pearce, 1992). Other policy measures included increasing support for large landholders, and the abandoning of smallholder development. The government further lifted all restrictions on foreign direct investments and privileged food security policies based on international commerce (Hutchful, 2002).

These reforms unleashed profound social and economic transformations in the Ghanaian countryside, marking a great watershed in the viability of smallholder farming (Pearce, 1992). Many small farmers were squeezed out of agriculture as their purchasing power became dramatically eroded. Additionally, input and output markets became volatile, constricted and competitive. Local products such as rice, maize, beef and poultry faced stiff competition from highly subsidized and cheap imports from Europe, Asia and North America (Hutchful, 2002). The effects of structural adjustment programs were geographically uneven across the country. Northern Ghana experienced the most severe impacts because of general underdevelopment and limited opportunities for non-farm incomes (Konadu-Agyemang, 2000; Songsore, 2003). Thus, structural adjustment intensified the already uneven regional development in Ghana. With persistent poverty and reduced agricultural productive capacity, a large number of small farmers were driven to cities where they worked as day labourers for minimal wages (Abdul-Korah, 2011).

Today, the political economic patterns initiated during colonial rule, together with the impacts of structural adjustment programs, are still lingering in northern Ghana (Yaro, 2013). Food importation continues to undercut domestic production in

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