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Farmers' perspectives on climate change manifestations in smallholder cocoa farms and shifts in cropping systems in the forest-savannah transitional zone of Ghana

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ABSTRACT

The study was conducted to explore actual manifestations of climate change in smallholder cocoa farms to aid extension response to climate impacts, and to understand the reasons for a renewed interest in cocoa production in the forest-savanna agro ecological landscape in Ghana, in spite of unfavorable climatic conditions. Two hundred cocoa farmers were interviewed in nine cocoa farming communities. Selected farms were also visited to document on-farm manifestation of climate impacts as well as innovations and strategies farmers are employing to respond to the adverse impacts of climate change on their cocoa systems. The results revealed various manifestations of climate impacts on cocoa farms which included, increased incidence of pests and diseases, wilting of cocoa leaves, high mortality of cocoa seedlings which affected expansion and farm rehabilitation, and wilting of cherelles resulting in low yield. The farmers maintained that their response to the immediate impacts of climate on cocoa was a shift to cereals due to the unpredictable climatic patterns and the shortened duration of rainfall. However, a combination of storage and supply chain challenges and low returns from cereal production, coupled with land scarcity in the Western Region, where most of them are migrant farmers accounted for their decision to return to cocoa production lately. It was observed, among other adaptive responses, that some farmers plant about three times the plantain suckers they usually plant, to provide a dense temporary shade over cocoa seedlings, and resort to planting more cocoa seedlings randomly per unit area on new farms, contrary to recommended planting approach, as a form of insurance against seedling mortality. More importantly, a community-based fire response system was identified to be a major safeguard mechanism to the threat of fire. Clearly, the farmers are not replanting cocoa in the forest-savanna agro ecological landscape because it is more productive than cereals, but they believe that a low yielding cocoa is far better than a productive cereal cropping systems that offer low returns when compared to cocoa. The study brings out the sustainable livelihood challenges of the rural farmer within the context of a changing climate for appropriate policy response.

1. Introduction

The cocoa sector in Ghana employs over 800,000 smallholder farm families and the number of cocoa farm owners in Ghana is estimated at 350,000 (Anim-Kwapong and Frimpong, 2008). For smallholder cocoa farmers, cocoa contributes about 70–100% of their annual household incomes (Ntiamoah and Afrane, 2008), making the cocoa sector very important to Ghana in terms of socioeconomic development. Notwithstanding the importance of the cocoa sector to the socio-economic development of Ghana, cocoa farming systems are still dependent on the weather and basic farming technologies to achieve production outputs. Thus, increases in cocoa production for centuries have been achieved through massive extensification, rather than intensification, at the expense of tropical rainforest (Ruf, 2007). Additionally, it is known that Africa, and for that matter Ghana, will be vulnerable to the impacts of climate change basically because most of the farming systems are dependent on climatic parameters, and also because most of these smallholder farmers are poor (IPCC, 2007). Cocoa is highly susceptible to drought and the pattern of cropping of cocoa is related to rainfall distribution (Anim-Kwapong and Frimpong, 2008). Rainfall therefore tends to be the biggest single factor influencing the distribution of cocoa in Ghana. It is the distribution of rain, especially in the dry

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season, rather than the total annual rainfall which is important. On the other hand, cocoa pods grow more quickly from March to June than they do from July to September when, among other factors, temperatures are lower (Anim-Kwapong and Frimpong, 2008). It is also well established that climate change could alter stages and rates of development of cocoa pests and pathogens, modify host resistance and result in changes in the physiology of the host – pathogen/pest interaction (Anim-Kwapong and Frimpong, 2008). The most likely consequence are shifts in the geographical distribution of physiology of the host – pathogen/pest, altered crop yields and crop losses, which will impact on socio-economic variables such as income, livelihood and farm level decision making (Anim-Kwapong and Frimpong, 2008). Given the relationship between climatic parameters and cocoa production and also the fact that cocoa is highly sensitive to changes in climate – from hours of sun, to rainfall and application of water and particularly to temperature due to effects of evapotranspiration, concerns of climate change and its impacts on cocoa production systems have become pertinent (Anim-Kwapong and Frimpong, 2008).

Ghana is experiencing a progressive increase in temperature with a corresponding decline in rainfall across all ecological zones (EPA, 2007). The Ghana Meteorological Agency's (GMet) has predicted continuous rise in temperature while rainfall is predicted to reduce in all agro-ecological zones in Ghana (EPA, 2007, Minia et al., 2004). Invariably, the patterns of agriculture production in Ghana have been impacted by the predicted changes, especially in the regions where the agro-ecological systems are in transition. Lacombe et al. (2012) and Owusu and Waylen (2012) provided evidence that communities in the transition zones of Ghana are experiencing climatic changes with both the major and minor raining seasons getting shorter and the length of the growing season decreasing, resulting in reduced ability of farmers to crop more than once in a year in most places. Owusu and Waylen (2012) further observed reduced rainfall in parts of the transition zone, as well as a reduction in both the major and minor rainy seasons and prolonged dry spells resulting in a high risk of crop failure during the minor rainy season, as the onset of the rain delays and early termination occurs.

Those known to be more vulnerable to the impacts of climate change are the various smallholder farmers, who are known for the bulk production of food and cash crops (Adjei-Nsiah and Kermah, 2012). Furthermore, changes in rainfall and temperature are affecting cocoa cultivation, with farmers indicating a unanimous awareness of climate change and its impacts on cocoa farming (Codjoe et al., 2013). Other studies by Asante and Gyampoh and Asante (2011) also documented farmer perception on climate change impacts on cocoa. But beyond these awareness and perceptions of climate change impacts on cocoa studies, there is limited information on the actual manifestations of climate change impacts on cocoa systems which could inform appropriate extension support and policy response for farmers. Additionally, the forest-savanna transitional zone of Ghana was dominated by cocoa prior to the 1980s, however, the cocoa economy began to decline in the early 1980s due mainly to rampant bushfires and worsening rainfall and temperature regimes, resulting in the conversion of most cocoa farms into cereal croplands. Recent observations however show that most farmers are now returning to cocoa farming, despite current and projected climatic variables in the forest-savanna transitional landscape depicting a progressive unsuitability for cocoa production (Bunn, 2015), unless proper adaptive measures are deployed in cocoa farming systems in this zone. It is not clear how Farmers' views of climate change impacts on crops influences their responses and decisions regarding choice of crops, and how their livelihood considerations shape decision regarding their choice of crops. The objectives of this study were therefore to understand from the perspective of farmers, changes that are occurring in the climate, the responses of farmers to these changes especially in the aftermath of the nationwide fire ravage, explore the specific strategies adopted for the post cocoa economy in the forest-savanna transitional zone of Ghana, the necessitating conditions resulting in farmers reversal to cocoa farming and climate change manifestations and adaptations in the current cocoa epoch in the forest − savannah transitional zone of Ghana.

2. Methodology

2.1. Study area

The focus area for the study were the Techiman Municipality (7.35° N, 1.56° W), Wenchi Municipality (7.75° N, 2.1° W) and Berekum Municipality (7.45° N, 2.59° W), all in the Brong Ahafo Region of Ghana. While the Wenchi Municipality belongs to the moist semi-deciduous and the guinea-savannah vegetation zones, Techiman Municipality encompasses three vegetation zones, namely guinea savannah woodland found at the northwest, semi-deciduous forest vegetation found at the south and the Transitional zone which stretches from the southeast to the west up to the north. Berekum Municipality is predominantly in the semi-deciduous zone. The study was conducted in nine (9) cocoa farming communities in the three municipalities; Nsuta, Tanoso, and Mangoase in the Techiman Municipality; Asuoagya area, Tromeso, and Wenchi in the Wenchi Municipality; and Abisase, Anyinasu and Tewbabi in the Berekum Municipality. These communities were selected because they were historically cocoa farming communities, and they shifted to cereal production and are now cultivating cocoa.

2.2. Methods of data collection

In order to ensure that respondents are able to provide a good historical perspective within the context of climate change, only farmers who were forty-five years and above were interviewed. The age limitation was aimed at getting a group of cocoa farmers who have lived from the 1970s to date in the study communities, in order to give a clear trend in the changes in climatic parameters. Thus, the focus of this paper only reflect the perspectives of the older generation, which does not include that of the youth. Because farmers easily relate with major events, the duration of the study was segregated into the pre-fire, post fire and the current epoch, in accordance with major fire issues in the landscape that occurred between 1981 to 1983. This was to give the farmers a proper sense of time, so they can fully engage with issues being discussed. A total of 270 cocoa farmers were sampled from all the nine communities. This comprised of thirty farmers from each community. Focus group discussions were held in each of the nine communities, which was combined with key informant interviews. Field level surveys and observations were carried out to obtain good visual understanding and appraisal of manifestations, cropping patterns and other bio-physical parameters which were to triangulate information from interviews and focus group discussion. Cocoa Extension Officers, the Technical Director of Cocoa Service Division (CSD), Municipal Directors of the Ministry of Food and Agriculture (MOFA), Produce Buying Companies (PBC), –the Forest Services Division (FSD) of the Forestry Commission, Municipal Chief Cocoa Farmers and old cocoa farmers in the communities formed the key informants purposively selected for the study. The data was collected from March to May, 2015.