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The role of international NGOs in climate change adaptation in the agricultural sector in the northern region of Ghana

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Abstract

This research was conducted in the northern region of Ghana to examine the role of International NGOs in the adaptation to climate change in the agricultural sector. The study employed descriptive research design and case study strategy within the qualitative approach. The data was obtained through the conduct of in-depth interviews with officials of five International NGOs and complemented by document studies as well as analysis of field reports. The study revealed that there was high priority on promoting early maturing crop varieties, agriculture extension to farmers and fertiliser use among the adaptation measures implemented by the International NGOs in the region. The study however, identified inadequate number of Agriculture Extension Agents, insufficient finances as well as logistics and equipment as the main challenges faced by International NGOs in climate change adaptation in the region. The study recommends that the government should adequately resource the Departments of Agriculture in the various Districts in terms of human, financial as well as working logistics and equipment to undertake their core functions to complement the efforts of the International NGOs. The study further recommends the need for collaborative research between the International NGOs and Research Institutions on climate change in the region.

Keywords: International Ngos; Adaptation; Climate Change; Agriculture; Northern Region

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1. Introduction

The Government of Ghana has acknowledged that extreme weather conditions are likely to increase as a result of continual instability in weather variables. Researchers; Ontoyin (1993), Stephens (1996), Stutley (2010) and Mabe et al. (2014) empirically established that climate change is evident in Ghana. Over the years, northern Ghana has experienced harsh weather conditions, climatic instability, and change. This has resulted in the exposure of the region to frequent floods with devastating effects on large areas of arable lands and infrastructure. Besides the floods, the region also experiences excessive rains during planting season, which adversely affect the growth of food crops such as maize, guinea corn and millet. Other daunting issues are persistent economic droughts, increasing temperature and declining precipitation, which are all attributed to climate change in the region (Stanturf et al., 2011; Yengoh et al., 2001). The impacts of climate change in the region are strongly felt by smallholder farmers whose livelihood depends on the utilisation of natural resources. This has affected their income and access to food.

Climate change poses a risk to livelihoods in Ghana. There is clear manifestation of drought and over flooding in some areas of the northern region of Ghana on an annual basis which has become a concern to residents and government. The three northern regions are more susceptible to the unpredictable patterns of the weather which has been triggered by climate change as compared to the rest of the country. This is because northern Ghana is more pronounced in terms of poverty, drier and predominantly relies on subsistence agriculture. In the bid to improve living standard and leverage the development of the northern region with the other parts of the country, there is the need for approaches that combine development of economic activities such as agriculture with portfolios of measures of climate change. This will eventually stimulate a tripartite win of economic, social and environmental outcomes of sustainability (Darko and Atazona, 2013).

Agriculture is the major occupation as well as the predominant livelihood source for people in the Northern Region of Ghana. According to Ghana Statistical Service (2013), about 74 percent of the entire active labour force in the region is involved in skilled food production, forestry and fishery. Besides Tamale Metropolis, skilled agriculture, forestry and fishery is the main driver of district economies in the remaining 25 districts. This is understandable given the fact that over two-thirds (69.7 percent) of the people in the region live in the rural setting. Farming or agriculture in the region is on a subsistence basis and as such, a greater portion of the land is left uncultivated. There are quite a few farmers who cultivate large acres of maize, yam and rice for commercial purposes. In general, acquisition of land for farming is not a problem in the region (Ghana Statistical Service, 2013).

Although agriculture is the main occupation and a source of livelihood of the people in the region, it is at the same time rain-fed. Since agriculture is fueled by rainfall in the region, the vulnerability of the sector to climate change and variability cannot be underestimated. Therefore, there is the need for conscious and concerted efforts from all and sundry to deal with the vulnerability of the region to climate change and variability. Efforts in this direction will not only salvage the region from the unavoidable impacts of climate change but would also go a long way to sustain the livelihoods of the people.

Despite the fact that agriculture remains the main occupation of the people of the Northern Region, analysis of Ghana's susceptibility to climate change shows that drought is ubiquitous at the national and regional level

with the three regions of northern Ghana been the most prone to climate variability. In a similar manner, the capacity of the three northern regions to adapt to climate change is the lowest across the nation as a result of minimal socioeconomic development as well as substantial reliance on indigenous economies and livelihoods that are fuelled by rain-fed systems especially agriculture and forestry (Stanturf et al., 2011).

There is ample evidence that yearly rainfall has declined as well as unpredictable pattern of rainfall which is on the ascendency in the northern region as a consequence of climate change. This has undesirably affected the livelihood of the people in the region (Amikuzino and Donkoh, 2012). Communities are increasingly facing daunting challenges in confronting weather events such as drought and flooding which has become extreme due to their frequency and intensity. It is noted that water is extremely germane to the thematic priorities and cross-sectoral issues in the development agenda of the Government of Ghana. However, water is gradually becoming uncommon resource in the three regions of the north as a result of the variability of climate.

In tandem with the stipulations of the National Climate Change Adaptation Strategy (2012), the three northern regions of Ghana's Regional Environmental Management Committees were reconstituted into Regional Climate Change Adaptation Monitoring Committees. In the same vein, ten Environmental Management Committees at the district level were equally reconstituted into District Adaptation Monitoring Committees. The committees have the oversight responsibility towards a multi-sectoral as well as different level of management and coordination of climate change and related policies, programmes, and projects at the regional and district level. The committees equally provide a platform for futuristic and sustained process for the comprehension of adaptation, synergies and gaps in addition to necessary adjustments in current interventions to ensure integration as well as contribute to a wider climate change discourse and development planning and outcome at all levels.

As a result of the inevitable impacts of climate change on the agricultural sector, there is the need for the adaptation. The need for adaptation of the agricultural sector to climate change in the northern region of Ghana is imperative because majority of the people livelihood depends on the sector. As frontline development agents concerned with poverty reduction, human rights and sustainable development, the role of International NGOs in climate change adaptation has been less explored as compared to other sectors. It is against this backdrop that this study seeks to understand agricultural climate change adaptation strategies that have been deployed by International NGOs in the Northern Region of Ghana.

2. Review of related literature

2.1. Climate change

There has been increased consensus regarding the reality of climate change across disciplines and professional expertise. As such, the United Nations Development Programme (UNDP) has stated unequivocally that the science is clear and the fierce debate about the existence of climate change is over. It further adds that climate change is taking place and it is necessary to act now without further delay (UNDP, 2008; cited in Laukkonen et al, 2009). Climate change regardless of how it is defined is the significant variation in either the average state

of the climate or variability in weather elements over a long period of time usually decades or longer. Climate change could be a consequence of natural endogenous processes or incessant changes in the anthropogenic composition of the atmosphere or land use (VijayaVenkataRaman, Iniyam and Goic, 2012). Climate change has profound adverse effects and impact on humanity and the environment. These adverse effects are intertwined and trigger a further deterioration of the existing climate change situation when it is business as usual as illustrated in figure 1.

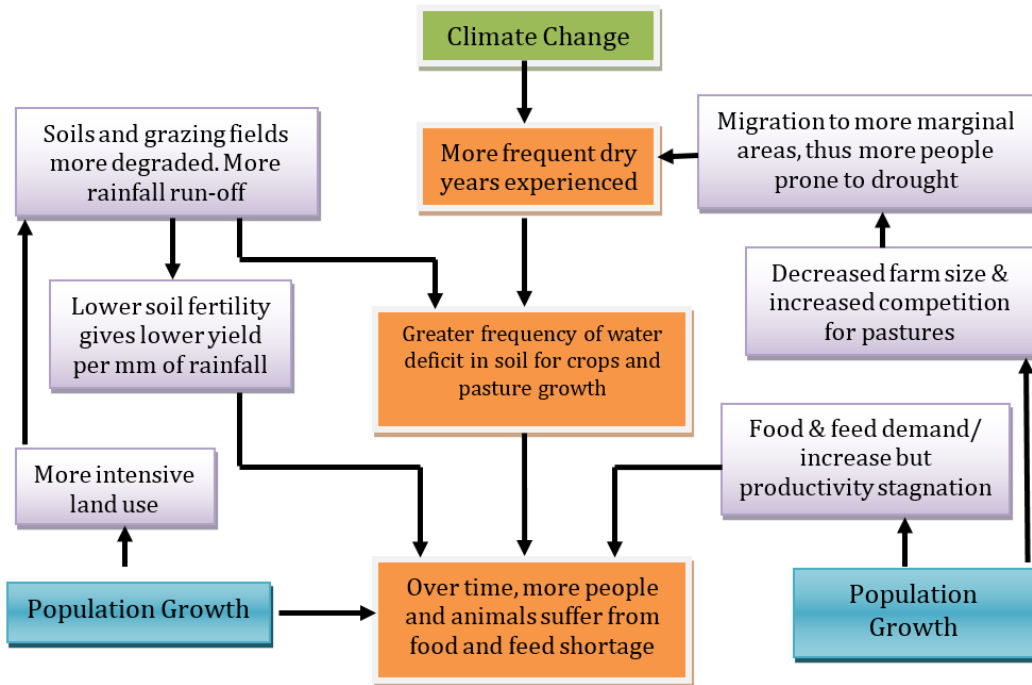


Figure 1. Conceptual Framework of Climate Change (Source: Author’s Construct, 2018)

Climate change leads to more frequent dry years; greater frequency of water deficiency in soil for crops and pasture for growth; soils and pastures become more degraded; lower soil fertility gives lower yield per millimeter of rainfall; food and feed demand increases but productivity decreases from year to year leading to decrease in farm size and increased competition for pastures. All these lead to more intensive use of farmlands as farmers would need to use more farm inputs in order to increase soil fertility to be able to attain good harvest. Smallholder farmers who cannot afford would be forced to migrate to more marginal areas, thus more people prone to drought and other natural disasters. These man-made activities degenerate further as a result of population growth.

Although climate change has been acknowledged as the 21st Century challenge to human and ecological systems, the pressing question is how to respond to the challenge of climate change. This has been a contending question for policymakers, government, the private sector, international or local non-governmental organisations (I/LNGOs), donors, local communities and researchers in the development discourse.

2.2. Climate change adaptation

The Intergovernmental Panel on Climate Change (IPCC) in its 4th Assessment Report defines climate change adaptation as “an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities” (IPCC 2007, as cited in Bréchet et al., 2013, p.218; UNISDR, 2009, p.4; Ahuja, 2007, as cited in Yulandhika and Nugrahanti, 2014, p.66). In another view, Burton (1997; as cited in Begum, Sarkar, Jaafar and Pereira, 2014, p.365) defines climate change adaptation as “the process through which people reduce the adverse effects of climate on their health and well-being, and take advantage of the opportunities that their climatic environment provides”. Similarly, Smith et al. (1996; as cited in Begum et al., 2014) explains that adaptation to climate change encompasses all adjustments either in the behaviour of people or the structure of the economy that minimises the vulnerability of society to changes resulting from the ramifications of the climate system.

Laukkonen et al. (2009), explicitly states that the aim of adaptation is to manage the unavoidable. This implies that adaptation aims at coping with the current and future impacts of climate change on human and ecological systems. Climate change adaptation has become necessary in view of the need to manage the impacts of climate change on the environment and society. Already, a lot of greenhouse gases have been released into the atmosphere from past human and industrial activities. There is also continues greenhouse gas emissions from fossil fuels, industrial activities and the transport sector. The possibility of the current mitigation policies and measures to be effective in addressing climate change might take time. Therefore, consequential future impacts are unavoidable and hence the need for adaptation (Yulandhika and Nugrahanti, 2014).

In the agricultural sector, adaptation is needed in view of the direct effects and impacts of climate change on the sector. Adaptation measures such as crop diversification, implementation of early warning systems, institution of insurance policies to mitigate poor harvest and other disasters, and improved management of water resources to mention but a few are needed in the agricultural sector (Bréchet et al., 2013).

2.3. Approaches to climate change adaptation

The approaches of adaptation to climate change consist of a broad spectrum of disciplinary approaches in response to the varied interests of stakeholders (Enríquez-de-Salamanca et al., 2017). In the classification of approaches to climate change adaptation, the authors argue that the dominant point of reference is the sectoral perspective. Based on the sectoral perspectives, the following approaches are discussed: the economic approach; the technical approach; the social approach; and the environmental approach.

The economic approach of adaptation to climate change is based on the cost and funding of adaptation measures. Adaptation to climate change involves financial resources to undertake measures that are capable of easing climate change impacts on the society and the environment. As a result, the cost and funding is an essential aspect to consider in adapting to climate change. It also focuses on the cost and benefits streams of adaptation and or other economic factors in the course of adaptation to climate change. Since adaptation to the exigencies of climate change is a private decision, it comes with varying cost and benefits to individuals.

The technical approach of adaptation to climate change is premised on the application of scientific knowledge in the design of measures. Some adaptation measures such as dyke and building construction involve the application and design of proposals to adapt to sea level rise and coastal flooding. In this regard, the proposal designs should be proven workable, functional and effective in terms of the aims of these measures in given circumstances.

The social approach of adaptation to climate change is based on the wellbeing of the population through the scaling up of community resilience to the impacts of climate change. It also focuses on sustainable access to food by the society, quality of life of the people and the extent to which the society accepts some of the adaptation measures such as cutting down on the consumption of specific products.

The environmental approach of adaptation to climate change considers both physical and biological resources in their natural state. In this approach, the important consideration is on the potential risk to ecosystems, biodiversity as well as landscape. Undoubtedly, mankind depends on the environment for survival and the enhancement of human welfare. Therefore, considering the threats to ecosystems, biodiversity, as well as the landscape is imperative in climate change adaptation. The approach further considers environmental pollution that can contribute to climate change.

2.4. Typology of climate change adaptation

The categorisation of climate change adaptation types are based on many factors and reasoning. The reasoning taken into account by actors in the climate change adaptation arena influences the kind of adaptation. In this vein, Enríquez-de-Salamanca et al. (2017) compiled the most comprehensive classification on climate change adaptation based on existing literature. According to the authors, the categorisation of adaptation to climate change relates to the intent, timing, temporal scope, spatial scope, form, hardness, strategy, mode of action as well as effects as presented in the table below.

Table 1. Types of Climate Change Adaptation and Attributes

Types	Attribute
Intent	Autonomous or spontaneous; planned, deliberate or intentional
Timing	Anticipatory, proactive or ex-ante; concurrent; responsive, reactive or ex-post
Temporal scope	Short term; long-term
Spatial scope	Localised; widespread
Form	
- <i>Planning</i>	Spatial and land-use planning; financial
- <i>Behaviour</i>	Institutional; informational; educational; behavioural
- <i>Action</i>	Technological; engineering and construction; ecosystem-based
Hardness	Hard; soft
Strategy	Protection or defence; retreat or move; accommodation
Mode of action	Reducing the sensitivity; altering the exposure; increasing the resilience
Effects	Incremental or preservationist; transformational

Source: Adapted from Enríquez-de-Salamanca et al., 2017, p.90

3. Methodology

3.1. Study area

The Northern Region is said to be the largest in terms of land area among the ten administrative regions of Ghana. It covers a land mass of approximately 70,384 square kilometres. The region is also the fourth largest with regards to population size with the region's population at 2,479,461 and having more females (50.4 percent) as against males (49.6 percent). The region shares boundaries with four other administrative regions and two neighbouring countries including the Upper East and Upper West Regions to the North; the Brong Ahafo and the Volta Regions to the South; the Republic of Togo to the East; and Côte D'Ivoire to the West. There are altogether twenty-six (26) Metropolitan, Municipal and District Assemblies (MMDAs) in the region (Ghana Statistical Service, 2013).

The topography of the northern region is generally flat and low-lying except in the north eastern corner where there is Gambaga escarpment (Government of Ghana, 2015). The climate in the region is characterised by alternate wet and dry seasons of equal length of six months. The region, therefore, experiences a unimodal rainfall pattern. The quantity of yearly rainfall ranges from 750 millimetres to 1,050 millimetres between May and October each year. The predominant vegetation is the Guinea Savannah Woodland made up of grasses interspersed with drought-resistant trees (Ghana Statistical Service, 2013).

It is on record that only 36.1 percent of the households in the region have access to electricity in the region. The rest of the population in the region rely on kerosene lamp and flash torch/flashlights for lighting (Ghana Statistical Service, 2013). For cooking, the households in the region mainly use fuelwood and a little use charcoal and other forms of energy. The use of fuelwood is about 76.5 percent, followed by 16.4 percent of charcoal users and 7.1 percent of other forms of energy such as liquefied petroleum gas, crop residue and animal waste. Apart from the Tamale metropolis, it has been established that more than 60 percent of all households in the remaining districts in the region use fuelwood as the main source of energy for cooking (Ghana Statistical Service, 2013). The high usage of fuelwood for cooking has several implications. This ranges from the destruction of the environment and its attendant problems as well as the health hazards associated with this traditional energy use.

3.2. Research design

The study employed a descriptive research. According to Glass and Hopkins (1984), descriptive research encompasses the collection of data that provides a description of an event and at the same time organizes, tabulate, portray and present an account of the data collection. Descriptive research more often than not uses visual aids including charts and graphs to assist the reader in the understanding of the distribution of the data. Due to the inability of the human mind to extract the complete import of large quantity of raw data, descriptive statistics are highly important in order to reduce the data into a form that can be manageable. Descriptive statistics are normally required when detailed account of small number of cases are involved. The research accordingly uses description as a means to organize data into patterns that emerge in the course of data

analysis. The established patterns help the mind to understand a qualitative research and its concomitant implications. The descriptive research therefore seeks to reveal the unique characteristics of a phenomenon of interest be it an individual or a situation. Bhattacharjee (2012) argues further that the observation ought to be guided by the scientific method and therefore, the results can be reliable as opposed to causal observation undertaken by untrained researchers. The case study method was also adopted within the remit of the qualitative approach to research. A case study encompasses an organised way of collecting sufficient data about a specific event, person, social setting or group in order to enable a researcher to have an in-depth understanding of the operations or function of the phenomenon of interest (Berg, 2001).

3.3. Sampling frame and technique

The sampling frame, in part consisted of available International NGOs in the northern region of Ghana. The first criteria that was used to determine an International NGO for the study was based on the country of origin and international visibility in terms of its operations in other countries and whose head office is not in Ghana. Having met the first criteria, the final criteria for inclusion/selection of an International NGO for the study was based on programmes and activities related to climate change. Therefore, International NGOs in the northern region that have programmes and activities in the area of addressing climate change were selected for the study.

The sampling method that was adopted is the purposive sampling technique. It is a non-probability sampling technique that is based on the researcher's use of his or her special knowledge or experience in selecting interviewees for a research. In the use of this sampling method, the researcher uses his/her judgment or knowledge to identify or select the subjects that are suitable for soliciting the needed data from the population. Even though this method has some shortcomings such as the problem of generalisation of the results, the strength of the use of purposive sampling technique lies in its ability to identify or select individuals with certain attributes that have the potential to provide detailed and reliable information for a study.

In short, the ultimate goal of purposive sampling technique is to provide a rich description of the situation as opposed to generalisation (Glassner et al., 1983, cited in Berg, 2001). In this manner, the researcher purposely selected five (5) International NGOs in the northern region of Ghana for the study. The International NGOs chosen for the research include: Adventist Development and Relief Agency (ADRA), Cooperative for Assistance and Relief Everywhere (CARE) International, Oxfam, Netherlands Development Organisation (SNV) and International Fertiliser Development Centre (IFDC).

3.4. Method of data collection

The credibility of research endeavor is measured in part on the way data has been collected. For this reason, the main research data collection techniques employed in this study was in-depth interviews, document study and analysis of field reports. The use of these techniques are, in part to simultaneously derive robust data as well as ascertain the veracity of the data collected in the field and to be able to triangulate findings at the analysis stage of the research. In-depth interviews were considered appropriate because it is the intention of

the researcher to understand the current situation on climate change adaptation in the region from the managers or programme officers of International NGOs in the region. Alongside the in-depth interviews, the document study and reports of the International NGOs was carried out. So during the field visit, relevant documents and reports of the organisations were sought and where the documents or the reports were available, the researcher was given copies.

3.5. Data analysis

There is a general consensus that data has no meaning without analysis and so data collected from the field was analysed qualitatively using 2010 Microsoft Excel spreadsheet packages. Qualitative analysis of data simply means analysis of non-numeric or text-based data from interviews and transcripts. It is important to mention that there is no linear way of doing a qualitative analysis of data. The bottom line in qualitative data analysis is to make sense out of the data or to understand the phenomena of the study in its social setting (Bhattacharjee, 2012). Since doing qualitative data analysis is not a straightforward process, a series of stages were adopted in analysing the data collected from the field. The stages were cyclical and iterative in that there were backward and forward processes in the analysis. To start with, there was data cleaning. At this step, the gathered data was screened to minimise errors and to complete all uncompleted statements during the filling of the interview questionnaire with the main intention of maintaining the original ideas or responses given by the respondents. After this, the data was inputted into 2010 Microsoft Excel spreadsheet packages to ease the analysis. Further interpretation was made to come out with a meaningful write-up.

4. Results and discussion

4.1. Climate change adaptation measures

The agricultural sector in the northern region is the main sector that has seen a lot of International NGOs interventions in climate change adaptation. The study revealed that climate change adaptation measures in the agricultural sector such as promoting early maturing crop varieties, agriculture extension services to farmers, better water management and promoting drought tolerant crops received a high priority among all the studied International NGOs. Apart from Oxfam which does not promote fertiliser use as well as integrated crop and pest management, the other four International NGOs prioritise these measures as high in their bid to assist smallholder farmers adapt to climate change. The adaptation measures which were promoted and or implemented by the International NGOs are discussed below and further summarised in table 2.

Promoting early maturing crop varieties: As a result of climate change, the rainfall pattern have changed and has become more unpredictable. There is therefore the need for short-gestation crops to be adopted to cope with the change in rainfall pattern. This adaptation measure was rated high among the studied International NGOs in the region.

Agriculture extension service to farmers: There is the need for knowledge to be made available to smallholder farmers through extension services on new methods of farming amidst climate change. The study revealed that all the International NGOs rated the measure as high in the adaptation to climate change in the region.

Marketing networks: The International NGOs also facilitate the access of smallholder farmers to markets. They do so by linking smallholder farmers to ready markets for their produce. The International NGOs equally encouraged smallholder farmers to identify potential consumers of their produce even before cropping. With the exception of the Oxfam, all the studied International NGOs rated the measure as high.

Off-farm income generating initiatives: The International NGOs also encourage smallholder farmers to process their produce such as rice and cassava. In the case of rice, the smallholder farmers are encouraged to parboil the rice while the cassava is processed into gari. The processed products would attract higher prices and would go a long way to provide additional earnings to the smallholder farmers. With respect to the rating of the measure, IFDC rated the measure low while ADRA and CARE International rated it moderate. The Oxfam and SNV on the other hand, rated the measure as high.

Improvement of land tenure system: Land, as it is widely recognised, is an important factor in farming. However, ownership of land varies from one area to another and among gender. Since land ownership in the region is male dominated, the International NGOs, through stakeholder participation, engages men or land owners to release land for landless smallholder farmers such as women to undertake farming activities. The International NGOs rated the measure as either low or moderate because of the complex nature of land ownership in the region.

Crop insurance: Efforts have been made by the International NGOs for smallholder farmers to buy into the idea of crop insurance. However, the use of the measure was limited because farmers must keep records of rainfall in their farmlands to prove that their crops failed because of drought to constitute the basis of claims from insurance companies. At the same time, farmers do not have access to rain gauges hence making the entire strategy difficult to implement. In that regard, the rating of the adaptation measure was high for IFDC whereas the rest of the NGOs rated it as either low or moderate.

Better water management: In view of the erratic rainfall pattern, it has become imperative for farmers to be educated and encouraged to make bunding or barricades in the farmlands to retain water for some time after rains. The retained water in the farmlands could improve the amount of water in the soil. The adaptation measure was rated high among all the International NGOs that were included in the study.

Irrigation Development: The location of the Northern Region predisposes that region to prolong drought. The climate in the region as stated earlier, is characterised by alternate wet and dry seasons of equal length of six months. The region, therefore, experiences a unimodal rainfall pattern. In view of the foregoing, the primary way of adapting to climate change and dry season farming is through the development of irrigation facilities. Apart from ADRA that rated the measure as low, all other NGOs rated the measure as high.

Fertiliser use: Fertile soils are very supportive for agriculture. However, the soils in the region are not fertile as compared to that of the southern part of the country. As a result, fertiliser use has become the primary means to improve crop yield in the region. The government of Ghana has also prioritised fertiliser use with the

introduction of the National Fertiliser Subsidy Programme by making fertiliser available and affordable to smallholder farmers through the District Departments of Agriculture. The study revealed that Oxfam does not encourage the use of inorganic fertiliser; and it is not in favour of the adaptation measure. However, the other NGOs all rated the measure as high.

Drought tolerant crop varieties: Rainfall patterns have changed and erratic. The Northern Region of late has experienced early rains but this is usually followed by dry spell which affect the growth of crops that have been planted. Therefore, there is the need to plant crops that could tolerate dry spell for some time. In that regard, the adaptation measure was rated high among the studied International NGOs.

Integrated crop and pest management: Pests are inimical to the growth and survival of crops. Consequently, the International NGOs encourage limited use of pesticides and instead promote organic ways such as the use of neem. The study indicated that Oxfam does not venture into the use of the adaptation measure. On the contrary, the other NGOs all rated the measure as high.

Other measures: The study revealed that apart from the above mentioned adaptation measures, two of the International NGOs, CARE International and SNV were engaged in the promotion of conservation agriculture or zero tillage among smallholder farmers. This measure is to ensure that the soil is not destabilised while smallholder farmers are able to increase their yield.

Table 2. Summary of priority of climate change adaptation measures in the agricultural sector by International NGOs

Climate Change Adaptation Measures	Priority of Adaptation measures by the International NGOs				
	ADRA	CARE Int.	Oxfam	SNV	IFDC
1. Promoting early maturing crop varieties	High	High	High	High	High
2. Agriculture extension service to farmers	High	High	High	High	High
3. Marketing networks	High	High	Moderate	High	High
4. Off-farm income generating initiatives	Moderate	Moderate	High	High	Low
5. Improvement of land tenure system	Low	Moderate	Low	Moderate	Moderate
6. Crop insurance	Moderate	Low	Moderate	Low	High
7. Better water management	High	High	High	High	High
8. Irrigation Development	Low	High	High	High	High
9. Fertiliser use	High	High	-	High	High
10. Drought tolerant crop varieties	High	High	High	High	High
11. Integrated crop and pest management	High	High	-	High	High
12. Other (conservation agric/Zero tillage)	-	High	-	High	-

Source: Field Survey, June 2017

4.2. Collaborations of the international NGOs in the agricultural sector

The Agricultural sector in developing countries such as Ghana is dominated by many different interests groups. It is expected that for any intervention in the agricultural sector to succeed, there is the need for collaboration to harness the strengths of each stakeholder. In this respect, the study analysed the collaboration of each of the International NGOs vis-à-vis other NGOs and state institutions as well as the kind of collaboration with these stakeholders.

The study found that ADRA had collaborated with the Department of Agriculture as the only state institution in the implementation of climate change adaptation measures in the region. This collaboration took the form of joint programmes and knowledge and information sharing. The study unraveled that officials of the department participated in round table discussions organised by ADRA on matters relating to the implementation of climate change adaptation measures for smallholder farmers. The study found however, that ADRA had no collaboration with any other NGO in the implementation of climate change adaptation strategies in the region.

In the case of CARE International, the study identified that Oxfam was the collaborator in the implementation of its programme in the West Mamprusi district in the region. Besides Oxfam, CARE International had equally collaborated with key state institutions including Department of Agriculture, Environmental Protection Agency (EPA), Savanna Agricultural Research Institute (SARI) and District Assembly in which the stakeholders were engaged in the sharing of knowledge and information on best practice in the adaptation to climate change in the region.

The study also found that Oxfam had collaboration with CARE International and Christian Children Fund of Canada (CCFC) by means of joint programmes; knowledge and information sharing; and implementation partnership. The study established that CARE International was the strategic partner in the implementations of its climate change adaptation activities. Similarly, Oxfam had collaborated with state institutions such as Department of Agriculture, SARI, District Assembly and Ghana Meteorological Agency (GMA). Specifically, Oxfam had collaborated with GMA to provide weather information to enable it offer advice to smallholder farmers and had contracted SARI to train farmers and supply improved seed varieties to smallholder farmers.

The study revealed that the SNV might probably be one of the influential International NGOs in the region because of its numerous collaborators both with other NGOs and state institutions. The study showed that SNV had collaborated with other NGOs including North Eastern Corridor Integrated Development Agency (NECIDA), Jaksally, ORGISS, Savannah Integrated Rural Development Aid (SIRDA), Youth Advocacy on Rights and Opportunities (YARO), TRADE AID, Community Development and Advocacy Centre (CODAC), MUYO Farms, Partners for Rural Development Action (PRUDA), and Grameen Ghana. The SNV in addition to joint programmes and knowledge and information sharing with other NGOs had offered capacity development especially to the local NGOs in the region. The SNV had collaborated with the following state institutions: Department of Agriculture, EPA, Forestry Commission and Cocoa Board. In the case of the state institutions, SNV had engaged the institutions in knowledge and information sharing as well as policy dialogue towards the adaptation of robust climate change policy regime through evidence-based discussions or workshops.

The IFDC also had collaborated with other NGOs and state institutions. In the realm of collaboration with other NGOs, the study identified that IFDC collaborated with ADVANCE II, Catholic Relief Service (CRS) and Africa 2000 Network (A2N) in the form of joint programmes; and knowledge and information sharing. The Department of Agriculture was identified as the only state institution that IFDC had collaborated with in the form of knowledge and information sharing in the implementation of its adaptation strategies to climate change.

4.3. Challenges of climate change adaptation in the agricultural sector by the international NGOs

Although there were different narratives of the challenges faced by the International NGOs in the adaptation to climate change, the challenges centred on human resources, funding, logistics and equipment. The most common challenge to all the International NGOs was the issue of inadequate staff such as Agricultural Extension Agents (AEAs) on the part of government and its own staff. The SNV further contends that there is lack of the requisite knowledge, skills and experience on the subject. As a result, efforts geared at climate change adaptation which has local benefits is being compounded by the knowledge gap.

Financing climate change interventions in the region is yet another challenge. Although the International NGOs were doing their bid to finance climate change programmes, government on the other hand, did not commit enough funds through the MMDAs for climate change adaptation in the region. Also, some of the International NGOs were willing to increase their coverage in the implementation of climate change adaptation programmes but were limited in terms of funding. The SNV also posit that climate change funds are available, but the problem has been the inability to access or attract these funding through robust proposals for climate change adaptation activities.

Another challenge confronted by the NGOs in the implementation of climate change adaptation programmes is the issue of logistics and equipment. The NGOs indicated that logistics and equipment needed to facilitate their work to assist smallholder farmers adapt to the repercussions of climate change was absent. There was a lack of modern data gathering equipment on climate change. Some AEAs do not also have means of transport to perform their core duty of agriculture extension services and technology transfer to farmers in the region. Under normal circumstances, the AEAs are supposed to complement the interventions of the NGOs in the agricultural sector in dealing with climate change, but that was not the case for many areas.

The SNV also notes that there was no coordinated effort directed at research into climate change from stakeholders such as universities, local communities, civil society organisations and government. The SNV contends that a lot of activities were taking place in addressing climate change in the region, but it was difficult to pinpoint the exact impact the interventions have made so far. The absence of a coordinated research effort to fine-tune the various stakeholders' interest in climate change poses a hindrance to addressing climate change in the region.

5. Conclusion

There is no gain saying that International NGOs have played a significant role in the adaptation of smallholder farmers to climate change in the Northern Region of Ghana through their interventions. Specifically, smallholder farmers have benefited from the benevolence of the International NGOs in the agricultural sector adaptation to climate change through the promotion of early maturing crop varieties, agriculture extension services to farmers, linking smallholder farmers to markets, off-farm income generating initiatives, improved land tenure system, crop insurance, better water management, irrigation development, fertiliser use, drought tolerant crop varieties, integrated crop and pest management and other measures including promotion of conservation agriculture or zero tillage among smallholder farmers. There were convergences as well as disparities in the level of priority of the adaptation measures. There were convergences in promoting early maturing crop varieties, agriculture extension services to farmers, better water management and promoting drought tolerant crops as high priority among all the studied International NGOs.

In the nutshell, climate change is detrimental to development and its impacts have no boundaries. As a result, there is the need for cooperation from all stakeholders such as government and development partners including International NGOs in developing countries to take urgent action to adapt to the short-term impacts of climate change while working towards the long-term mitigation of climate change.

6. Recommendations

The study identified that there were gaps in the knowledge on climate change in the region. The gap in the existing knowledge on climate change alluded by some of the respondents could be addressed by fostering research collaboration between Research Institutions such as the University for Development Studies (UDS) and Savanna Agricultural Research Institute (SARI) on one hand and the International NGOs on the other hand in the region. The Department of Climate Change and Food Security of the UDS and SARI on one part, and the International NGOs on the other part could create a learning platform for the dissemination of research results on climate change. This would go a long way to reduce duplication of research efforts on climate change and hence, harness the strengths of all stakeholders in the region. For instance, the International NGOs and government could provide funding while the University which has a tripartite mandate of teaching, research and community service could conduct climate change research and subsequently make the research results available to all stakeholders.

The District Departments of Agriculture should be adequately resourced in terms of human, financial as well as working logistics and equipment to undertake their core functions. As a matter of urgency, the central government should lift the embargo on employment to enable the MMDAs to employ qualified persons to fill the staff gaps especially the Agricultural Extension Agents (AEAs) for the agricultural sector. The availability of AEAs with the right mix of skills could assist smallholder farmers to adapt climate change methods in order to improve their yield in the region. The central government should further budget and allocate funds that are meant for climate change activities in the region. Similarly, the provision of means of transport such as

motorbikes and in some few cases vehicles and other logistics that will facilitate the work of the District Departments of Agriculture should be done by central government.

References

- Amikuzino, J. and Donkoh, S. (2012), "Climate variability and yields of major staple food crops in Northern Ghana", *African Crop Science Journal*, Vol. 20, pp. 349-60.
- Begum, R.A, Sarkar, S.K, Jaafar, A.H. and Pereira, J.J. (2014), "Toward conceptual frameworks for linking disaster risk reduction and climate change adaptation", *International Journal of Disaster Risk Reduction*, Vol. 10, pp. 362-373.
- Bréchet, T., Hritonenko, N. and Yatsenko, Y. (2013), "Adaptation and Mitigation in Long-term Climate Policy", *Environmental Resource Economics*, Vol. 55, pp. 217-243.
- Darko, E. and Atazona, L. (2013), "Literature Review on the Impact of Climate change on economic Development in Northern Ghana- Challenges and Opportunities", *EPS PEAKS, UK*. Available at: https://assets.publishing.service.gov.uk/media/57a08a09ed915d3cfd00055e/Literature_Review_of_the_impact_of_climate_change_on_economic_development_in_Ghana_PartII.pdf (accessed 10 April 2017).
- Enríquez-de-Salamanca, Á., Díaz-Sierra, R., Martín-Aranda, R.M. and Santos, M.J. (2017), "Environmental Impacts of Climate Change Adaptation", *Environmental Impact Assessment Review*, Vol. 64, pp. 87-96.
- Laukkonen, J., Blanco, P.K., Lenhart, J., Keiner, M., Cavric, B. and Kinuthia-Njenga, C. (2009), "Combining climate change adaptation and mitigation measures at the local level", *Habitat International*, Vol. 33, pp. 287-292.
- Mabe, F.N., Sarpong, D.B. and Osei-Asare, Y. (2014), "Empirical Evidence of Climate Change: Effects on Rice Production in the Northern Region of Ghana", *British Journal of Economics, Management & Trade*, Vol. 4 No. 4, pp. 551-562.
- Stephens, C.S. (1996), "Some empirical evidence of global warming in Ghana", *Ghana Journal of Science*, Vol. 3, pp. 31-36.
- Yengoh, G.T., Armah, F.A., Onumah, E.E. and Odoi, J.O. (2010), "Trends in agricultural-relevant rainfall Characteristics for small-scale agriculture in Northern Ghana", *Journal of Agricultural Science*, Vol. 2, No. 3, pp. 3-16.
- Yulandhika, T. and Nugrahanti, I.M. (2014), "Mitigation and Adaptation Planning of Climate Change in East Kalimantan: A Critical Review", *Procedia - Social and Behavioral Sciences*, Vol. 135, pp. 64 - 69.
- VijayaVenkataRaman, S., Iniyan, S. and Goic, R. (2012), "A review of climate change, mitigation and adaptation", *Renewable and Sustainable Energy Reviews*, Vol. 16, pp. 878- 897.
- Berg, L.B. (2001), "Qualitative Research Methods for the Social Sciences", *4th Edition*: Allyn & Bacon at www.abacon.com
- Bhattacharjee, A. (2012), "Social Science Research: Principles, Methods, and Practices", Textbooks Collection. Book 3. Available at: http://scholarcommons.usf.edu/oa_textbooks/3

Ghana Statistical Service (2013), "2010 Population and Housing Census: Regional analytical Report-Northern Region", Accra: Ghana Statistical Service.

Glass, G.V. and Hopkins, K.D. (1984), "Statistical Methods in Education and Psychology", 2nd Edition, Englewood Cliffs, N. J.: Prentice-Hall.

Government of Ghana (2015), "Volume I: Situational Analysis and Major Issues: Spatial Development Framework for the Northern Savannah Ecological Zone (2015-2035)", Available at: [SDF%20for%20NSEZ%20.pdf](#) (accessed 25 April 2017).

Ministry of Environment, Science, Technology and Innovation (MESTI) (2012), National Climate Change Adaptation Strategy. Available at: http://www.undpalm.org/sites/default/files/downloads/ghana_national_climate_change_adaptation_strategy_nccas.pdf (accessed 12 March 2017).

Stanturf, A.J., Warren Jr., M.L. Charnley, S., Polasky, S.C., Goodrick, S.L., Armah, F. and Nyako, Y.A. (2011), "Ghana climate change vulnerability and adaptation assessment", Available at: <http://www.encapafrika.org/documents/biofor/Climate%20Change%20> (accessed 8 June 2017).

Stutley, C. (2010), "Innovation Insurance Product for the Adaptation to Climate Change", Available at: <http://seguros.riesgoycambioclimatico.org/DocInteres/eng/Ghana-Crop-Insurance.pdf> (accessed 10 January 2017).

UNISDR (2009), "Terminology on Disaster Risk Reduction", Geneva, Switzerland. Available at: www.unisdr.org/publications (accessed 18 July 2017).

Ontoyin Y. (1993), "A comparative study of temperature as a climate indicator for the periods 1931-60 and 1961-90", *Proceedings of a workshop on climate change and its impacts on water, ocean fishing and coastal zones*, CSSIR, Accra, Ghana. 16th - 18th March.