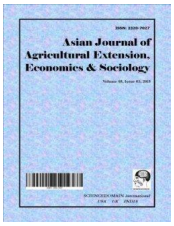

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Peasant Associations and Implementation of Climate Change Adaptation Practices in the Northern and Brong-Ahafo Regions of Ghana

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Peasant association plays a central role in climate change adaptation. Farmer-based associations serve as a conduit for the implementation of climate change adaptation practices by contributing to knowledge sharing and assimilation. In Ghana, the role of peasant associations in climate change adaptation is unnoticed. Employing a mixed research approaches the procurement of data, this study gives a deeper understanding of peasant associations and their activities of two regions in the country. It also examines the contributions of peasant associations to climate change adaptation. It was established that peasant associations promoted understanding and implementation of climate change adaptation strategies including preparation and application of compost, residue management, row/distance planting, use of drought tolerant seeds, afforestation and crop rotation which benefited farmers in getting more yield and by extension being able to reinvest in their farms and venture into other livelihood strategies. The study concluded that Non- Governmental Organizations interested in climate change adaptation should target and build the capacity of farmer peasant groups for appropriate climate change adaptation and achievement of poverty alleviation and long-term food security.

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Keywords: Climate change; adaptation, peasant association; poverty alleviation.

1. INTRODUCTION

For past few centuries, peasant agriculture has been the fundamental activity for mankind in the pursuit of poverty and sustainable development. But in recent times, the prevalence of smallholding and/or peasantry is still evident as three of every four people in developing nations live in rural areas [1,2] In the foreseeable future, peasant farming has been envisioned to continue to provide food for direct human consumption in both developed and developing nations. Also, it will provide livestock feed to satisfy the rapidly growing demand for meat, milk, and eggs in newly industrialising countries [3,2]. The capacity of peasant agriculture to provide sufficient food and raw materials is however threatened by the galloping world population growth and climate change [4]. The quest to increase food production to meet demand has been a salient element in national affairs and international fora, generating tension and the desire for conventional intensification measures among farmers [5,6] Aside, agriculture is currently at crossings as the looming calamity from climate change has compounded water shortage, prolonged drought and climate-induced human ailments exacerbating food deficiency [7,8,9,10].

In the face of climate change, peasant agriculture becomes more vulnerable and adversely affected. DeLonge et al., [11] for instance, observed that climate change is already influencing peasant crop production and distribution exacerbating the risks associated with farming. The IPCC [7] also reports that crop yields from smallholder farmers in most developing countries are declining due to the consequences of climate change with more adverse future impacts under business as usual scenario. Needed interventions are required at all levels to help smallholder farmers adapt to the effects of changing the climate. Appropriate climate change adaptation interventions are expected to prevent and/or minimise the damage climate change can cause while helping farmers take advantage of opportunities that may arise [3,12,13,14,15].

In the view of Guan et al., [16], a successful adaptation of agriculture to climate change is central to meet increasing food demands. Successful adaptations should be able to cope with the short-term variability as well as the negative impacts of climate change in the long-term [17,18]. Various possible adaptation practices for crop production have been proposed or assessed in the literature ranging from technology, management or a combination of the two [19]. Options including changes in crop cultivars and types [20]. improved drought and heat seeds [21], [22], changes in sowing rules that shift the crop growth period [23], [17], [24], water harvesting [25], [21] and irrigation [26] [27] no-tillage [28] and the formation of farmer associations [29], [13] [30]. Farmer-Based Associations (FBA) serve as a conduit for the implementation of climate change adaptation practices. Farmer associations bring farmers together for knowledge sharing, training purposes and general community development [13]. Associations spearhead the various activities of farmers in the rural communities including marketing of farm products, bargaining attractive prices and negotiating contracts for farm inputs [31,32], facilitate understanding and enhancement of new skills for the adoption of adaptation practices [33,34]. The climate-smart village model outlined by Agrawwal et al., [13], and World Bank (2010) classify farmer associations as a climate-smart weather practice that can promote farmers understanding of weather events and serve as a push for farmers to act accordingly.

Peasant associations have existed for decades in many parts of the world; contributed to the community-driven development and served as the mouthpiece/mediator for farmers, farmers- government and farmers-private/Non-Governmental Organisations [35]. They play a significant role in the daily lives of peasants because of the manifold (economic and social) activities they are involved in and the manner in which they extend a peasant's social network beyond family [36], DeJanvry & Sadoulet, 2004). Climate change adaptation has broadened the capacity of community-based peasant associations to enhance adaptation [8,37]. The World Bank for instance, has been involved in participatory approaches to adaptation and this has triggered the involvement of farmer groups in the design and implementation of adaptation projects, thus fostering acceptance and local appropriation (World Bank, 2010). National governments are also decentralising climate change adaptation services [14] and mainstreaming climate change through farmer associations [38] Channelling agricultural assistance through community-based

organisation significantly influences efficient and appropriate use due to a reduction in ethnic discrimination and minority stereotyping [31,32].

In sub-Saharan Africa, farmers' peasant associations are pervasive and their activities creating more opportunities for agriculture development and climate change adaptation [36], Peasant cooperatives in Sub-Saharan Africa provide the opportunity for poor people to raise their incomes, strengthen democracies by empowering people to own their solutions, increase security for members and contribute directly and indirectly to the education of children [39,32]. In the Ghanaian context, although several community-based peasant associations exist and more being formed to support current efforts in climate change adaptation, literature has not been explicit on the contribution of these associations to climate change adaptation. The valuable contributions of these associations in the rise to climate change adaptation have been unnoticed. The study, therefore, probes to give a deeper understanding of peasant associations and their activities in the promotion of climate change adaptation. Data is referenced to the Adaptation of Agro-Ecosystems to Climate Change (AAESCC) project in the Market-Oriented Agriculture Programme (MOAP) of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

1.1 Concept of Smallholder Farmers' Associations in Ghana

A peasant association has been described by "National Smallholder Farmers Association of Malawi"-(NASFAM) as a smallholder farmer-owned and smallholder farmer controlled business that provides services to member smallholders on a non- profit or cost basis. These associations are made up of farmers with similar problems and similar needs to seek for solutions. Activities can be in the form of agitating for the decrease in fertilizer prices, marketing of crops, negotiating for low access credit and available transport for produce [31]. In the view of Dadson, [40] peasant associations are civic organisations registered or non-registered that are involved in collective action for the purpose of addressing member's needs. In Ghana, farmers engaged in collective activities long before the introduction of formal farmer groups and cooperatives. Collective activities among farmers can be traced back to the pre-colonial period during which neighbouring farmers (usually relatives and friends) provided each other with reciprocal labour support on their fields, especially weeding [41,42]. In the late 1920s, the British colonial administration in Ghana introduced formal farmer organisations in the form of cooperatives to improve the quality and marketing of cocoa as well as provide loan facilities to farmers [43], [44]. Early success in cooperative development stimulated a rapid expansion of cooperatives first in the cocoa sector which subsequently expanded to other crops.

The Department of Cooperatives (DOC) was established in 1944 specifically for overseeing cooperative development in Ghana [40] After independence, various governments of Ghana viewed cooperatives as key instruments for agricultural and rural development, although cooperative development during this period underwent frequent and major changes in direction [40] During the late 1980s, state-controlled cooperatives started to dissolve perhaps due to growing global pressure for structural reforms towards market liberalization. Subsequent governments in Ghana, therefore, adopted a liberal approach to the development of cooperatives, allowing other types of rural and farmers' self-help organisations for income-generating activities to be formed, all of which are commonly referred to as Farmer-Based Organizations (FBOs) or Peasant Associations (PA).

In the past two decades, Ghana has witnessed many governmental and nongovernmental projects [45] seeking to promote FBO/PA development. In particular, between 2000 and 2007, the World Bank alone invested more than US$9 million for the development of FBOs as part of AgSSIP [30]. In 2007, the Millennium Challenge Corporation (MCC) also approved a five-year US$547 million anti-poverty compact with the Government of Ghana and a significant proportion of this amount has been used in the development FBOs. Salifu et al*.,* [45]. estimated the number of FBOs in Ghana to be around 10,000 and noted that the rapid rise of FBOs is partly due to NGOs, government agencies, and private investors who increasingly see rural collective action as one important means to achieve agri-business development objectives.

1.2 Overview of the AAECC-GIZ Project

The Adaptation of Agro-Ecosystems to Climate Change is a component of the Market- Oriented Agricultural Program of the GIZ with the objective

of reducing climate-related yield losses for farmers and to incorporate the results of the measures into the agricultural sector policy on adapting land-use systems to climate change. The AAESCC is a 5-year project which started from 6/2012 with a lifespan up to 12/2017. It is one of the projects of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the Ministry of Food and Agriculture (MoFA) of Ghana. The project covers the Northern and Brong-Ahafo regions of Ghana with four districts in each region, two communities in each district and with a target of 600 direct beneficiaries. In order to facilitate the successful adoption of climate change adaptation practices, the project initiated peasant associations called Common Interest Groups (CIGs) in the various communities of the project operation. Some of these associations already existed in some of the communities before the re-enforcement by the AAESCC project. The groups aided in bringing farmers together for training purposes, discussions and knowledge sharing. Also, motivated easy understanding and appropriate implementation of adaptation practices through collaborative efforts. In each community one association was initiated involving interested members of the entire community. However, within each community group, farmers were further organised under the following themes; agroforestry, soil fertility management, soil water conservation, bushfire management and seed production. For the purpose of this study, peasant associations and CIGs will be used interchangeably but means the same thing.

2. MATERIALS AND METHODS

The study adopted a mixed research approach, thus, qualitative and quantitative. Four districts were randomly selected from the project's districts of operation. These were Atebubu-Amantin, Kintampo-North, Bole and Sawla-Tuna-Kalba Districts. Atebubu-Amantin District and Kintampo Municipal are located in the Brong-Ahafo Region (BAR) and the Bole and Sawla-Tuna-Kalba Districts in the Northern Region (NR). The project operates in two communities in each district implying eight (8) communities used in the study. A Focus Group Discussion (FGD) was organised in each community with the CIG/peasant association. This provided information on the activities of the CIGs including formation, membership, support with interventions and challenges with the groups. Subsequently, 10 farmers were selected from the group based on voluntary participation for a household and farm level physical verification of climate change interventions received and implemented. Eighty (80) farmers were selected in all for the entire study and 8 FGDs conducted. An interview guide was used to collect information from the FGDs and a semi-questionnaire used to solicit information from the individual farmers. A Canon Power Shot A2600 camera was used to take pictures of the adaptation practices through the household and farm level physical verification. It was recognised that most of the farmers could not read nor write so the questionnaire administration was done in an interview schedule format, thus, farmers were asked the questions in their local language in a discussion form and subsequently the responses filled by the researcher. The Statistical Product for Service Solution (SPSS) version 22 was used to analyse the quantitative data and NVIVO 11 (qualitative data analyses software) for the qualitative. The activities of the groups were examined in line with; formation and organisation, membership characteristics, leadership characteristics, contribution to a common fund, purpose (s) of meetings/formation and challenges of associations [38,31,32,36].

3. RESULTS AND DISCUSSION

3.1 Activities of Peasant Associations/ CIGs in NR and BAR

3.1.1 Formation and organisation

Formation of peasant associations/CIGs in the Brong-Ahafo region existed before the initiation by the AAESCC project and other NGOs. Smallholder farmers were already organised and having meetings on their own, engaging in communal labour, attending funerals, naming ceremonies and ensuring general community development. This is not strange as Salifu et al. [31] observed that farmers in Ghana have already been involved in common reciprocal activities like communal labour and support for children education before the emergence of the formation of formal farmer- based organisations. In the NR, the formation of most farmer-based associations was motivated by Non-Governmental Organisations (NGOs). Even though smaller associations existed previously, their activities were not vibrant. The northern region has been identified as one of the vulnerable areas under the savannah agro-ecological zone [46,47] and confronted with climate perturbations, poverty and conflicts

affecting the livelihoods of people [48] resulting in the formation of several NGOs and community-based organisations to promote growth and development in the area [49].

Unlike the BAR, constitutions were established for the management of many of the peasant associations in NR. A constitution in this study is conceptualised as a formal written document containing rules and regulations governing the activities and behaviour of members and accepted by all members [50] BAR peasant associations did not have formal written down rules and regulations governing operations, however, expressed interest in receiving training on the formation of constitutions.

We do not have written down rules and regulations because we do not know how that works. We would like to have that in our association because some of the farmers misbehave (Farmer 1 BAR). Farmer 1 NR stated; we were trained on how to manage our groups including having written down rules by some organisations especially the AAESCC project. We have therefore adopted this strategy and have written the rules and regulations that should guide us. Every member has accepted these rules and tries to remember and obey them at all times.

Associations in BAR on the average meet three (3) times a year whereas the NR meet approximately five (5) times. These meetings were "self-group" called meetings (the association meeting voluntarily) and external stakeholders called meetings (meetings with NGOs, Agriculture Extension Officers and other private entities. In the BAR, "self-group" called meetings were more as compared to the NR. Most of the associations meetings in the NR organised and coordinated by NGOs or AEAs. Members of the associations hardly meet on their own.

3.1.2 Membership and leadership characteristics

Membership within the groups for BAR was stable as most of the farmers who joined the group since the beginning are still part.

Since we formed the group, no farmer voluntarily left apart from those who died, we are all committed to the activities of our group as it helps us obtain support from government and NGOs. When members have problems we sit them down, discuss issues with them and address the situation (Farmer 2, BAR).

Adverse concerns were noted with the NR, membership was not stable as some of the farmers left.

Members are not united as the quarrel during meetings. Some also form factions and do not want to be part of any association. Some farmers only show up when NGO officers or AEAs are meeting all the farmers (Farmer 2, NR).

Membership of the groups was made up of males and females, indigenes and migrants. Males dominated the groups for both BAR and NR. In most Ghanaian communities, especially within the savannah ecological zone, females have less access to land [51,52], Landholding is the priority of men and females' access to land is dependent on contractual agreement with husbands or husbands voluntarily donating lands [53] Traditionally, patrilineal inheritance is also associated with the people in the area given credence to men as successors. Even though, Abubakari et al., [54] argue that more females are involved in farming activities, they are only used as labourers leading to their low participation in associations.

Migrants dominated the associations for both regions. For BAR, the study communities were inundated with people from other parts of the country especially the three regions of the north. Even though the areas under study are all under the northern savannah ecological zone, the BAR has been noted to have more prospects for agriculture production (MoFA, 2014). It has a bi-modal rainfall system which supports two seasons farming, a diverse range of vegetative cover and soils that support several on-farm and off-farm agricultural activities attracting immigrants from the north and parts of Burkina Faso who have less of such opportunities [55] Immigrants likewise dominated the NR communities. The communities were filled with people from different tribes and ethnic groups rather than indigenes. The study communities in NR support cashew farming; people migrate to these areas to indulge in this lucrative venture. The average number of members within a group was 30 with males averaging 20 and females 15. The leadership of the groups was effective and leaders coordinated activities satisfactorily. Lead farmers were often selected through balloting or direct appointments and tasked with the responsibility of mobilising and organising

meetings, assigning roles to members and representing the groups in other gatherings.

3.1.3 Purposes for formation of associations /meetings

The motives for formation of the associations were to engage in community activities including attending funerals, weddings, naming ceremonies and most importantly support each other on farms. Aside, receiving interventions and support was a major objective for groups' formation. For instance, apart from the engagement with the GIZ-AAESCC project for climate change interventions, there were other organisations including World Vision and the United Nations Children Fund (UNICEF), Savannah Accelerated Development Authority (SADA), Northern Region Growth Programme (NRGP) and Associations of Churches Development Programme (ACDEP) involved in farmer-based education on good storage measures, savings and loans strategies and plantation farming. The associations also served as a source of motivation for farmers to diversify into other livelihood strategies including petty trading, carpentry, teaching, sanitation officers, grass cutter rearing and mushroom cultivation.

3.1.4 Challenges with associations

Common challenges confronting the groups included; difficulty in organising meetings. Farmers engage in on-farm and off-farm activities at different times, finding a favourable time to bring all group members was problematic. Aside, each farmer wants the meeting to be organised at his/her convenience.

We never agree on a specific time for meeting, we work at different times and is always difficult for all of us to agree on a specific time so the leaders of the group take a decision and announce the time those present go ahead with the meeting (Farmer 3, BAR). Another challenge was lack of an appropriate place for meetings. It was observed that most of the associations meet under trees therefore they always have to battle with rains and storms.

We sometimes run away from the tree when there is rain or storm, so the meeting is either postponed or cancelled until further notice or does not take place again at all. This affects our ability to hold meetings frequently (Farmer 3 NR). Farmers also complained about individual factions within groups reducing the strength of the associations. In some of the communities. Individual differences and personal grudges are brought to associations causing conflicts. For instance, farmer in NR professed; some of the members tell others not to come because they have problems with other farmers in the community. Membership of our group has reduced because of this and some people do not want to join.

3.2 Implementation of Climate Change Adaptation Practices by Peasant Associations/CIGs Members in NR

Most of the peasant associations/CIG farmers (15.2%) in the region were engaged in the preparation and application of compost on their farms (Table 1). This was as a result of a series of training and demonstration sessions organised by the GIZ-AAESCC project and other organisations. Compost manure is a low cost manure and easy to prepare. Farmers are already confronted with climate change resulting in low yields and incomes, being able to implement this practice reduces their cost of production and enhances higher productivity (Lieffering et al., 2016; Guan, 2015). The majority (13.9%) also adopted residue management (leaving residue on farm) after harvesting and 12.7% did intercropping. Row/line planting (11.4%) and rotating crops seasonally (11.4%) were also implemented by farmers (Table 1). The CIGs/associations were used as focal points for the transfer of knowledge and technology on climate change adaptation. For instance, Farmer 4 BAR said; we have learned how to dig a hole, gather animal droppings, cowpea, maize or millet residue and put into the hole. Add some water if it is not raining and some ashes and cover. Leave the residue to rot (decompose), when the farming season begins then we either spread it on the farm for the tractor to till or allow plants to grow and before we place the compost side by side the crops. We did not know method very well but through the NGOs activities with our associations we have all learned to implement this practice.

Farmer 3 NR; the NGOs trained us to spread the manure on the farm before tilling the soil and if you want to place by the crop do not put the manure so close but leave a distance (maximum 10 cm) from the crop stalk and place the manure. This is very good as I have seen that the plants are growing very well with this method.

3.3 Implementation of Climate Change Adaptation Practices by Peasant Associations/CIGs Members in BAR

At the BAR, 27.1% of the CIG farmers were engaged in tree planting/afforestation. Farmers adopted the practice of planting trees around their farms and households (Table 2). The AAESCC project and other NGOs trained farmers on nursing and transplanting of seedlings and also educated them on the relevance of using trees as wind breaks accounting for farmers implementing this practice. Row/line planting (14.6%), use of drought tolerant seeds (8.3%) and application of farm yard manure (5.2%) were also indicated as adaptation practices implemented by CIG farmers (Table 2). Farmers were supplied with drought tolerant maize trial seeds of which they were trained to produce more variety out of what was supplied. Farmers were also trained on how to plant in rows by giving an acceptable distance to support plant growth. Other farm level activities which farmers learned and were practicing are wearing of protective clothing during spraying and creating of fire belts around farms.

We have been trained on how to prepare and transplant seedlings. For instance, we were taught that when we want to transplant seedlings, we should dig the top soil and put it aside then when the plant is put into the hole we should put the top soil first and add some manure before we cover with other soil (Farmer 4 NR). Farmer 5 BAR also stated; we were trained to cover our nose with mask, wear gloves and long dresses when we are going to spray our farms. We should also wash our hands very well with soap after spraying. I have been doing that and it's really helpful.

3.4 Benefits of Implementing Adaptation Practices by Farmers

It was acknowledged that some of the adaptation practices helped increase crop productivity (39.6%). Improve soil fertility (34.0%) and retention of water/soil moisture (18.9%) were also benefits farmers gained from implementing the adaptation practices (Fig. 1). Composting and application of farmyard manure are organic sources of nutrients for plants growth and water retention. They are efficient in enhancing crop productivity and reducing farmers cost of production [56,8] Distance/row planting also limits or avoids nutrients competition. Usually, farmers hold the notion that planting several crops within a piece of land is tandem to higher productivity resulting in 'crowd planting' [57,58]. Crowded crops become competitors for water, nitrogen, sunlight and other nutrients impeding growth. Stunted growth becomes a common characteristic of crops that have been crowded. Use of drought tolerant seeds offers the opportunity to prevent climate change-related losses. Farmers are able to achieve maximum yield in the face of prolonged drought. Framers stating increase crop productivity, improve soil fertility and soil water retention as benefits could probably be as a result of the implementation of adaptation practices such preparation and application of compost manure, row/distance planting, application of farmyard manure and use of drought-tolerant seeds.

Table 1. Implementation of climate change adaptation practices by peasant associations/CIGs members in NR

Adaptation practices	Responses (n)	Percentage (%)
Preparation & application of compost	12	15.2
Leaving residue on the farm	11	13.9
Intercropping	10	12.7
Row/line planting	9	11.4
Rotating crops	9	11.4
Tree planting/afforestation	7	8.9
Application of farmyard manure	7	8.9
Creating fire belts	5	6.3
Land fallowing	5	6.3
Use of drought tolerant seedlings	4	5.1
Total	79	100

**multiple response*

Table 2. Implementation of climate change adaptation practices by peasant associations/CIGs members in BAR

Adaptation practices	Responses (n)	Percentage (%)
Afforestation/tree planting	26	27.1
Row/line planting	14	14.6
Leaving residue on the farm	12	12.5
Preparation & application of compost	11	11.5
Intercropping	9	9.4
Use of drought resistant seeds	8	8.3
Application of farm yard manure	5	5.2
Wearing protective clothing	4	4.2
Creating fire belt	4	4.2
Water conservation	3	3.0
Total	96	100

**multiple response*

Plate 1. Compost pit at *Blema* (compost removed)

Plate 2. Applied compost to maize at *Balee*

Plate 3. Prepared seedlings to be planted

Plate 4. Compost ready to be applied

Plate 5. Row/line planting

Plate 6. Rotation with groundnuts

Plate 7. Rotation with cowpea

Plate 8. Residue gathered to be put into a compose pit

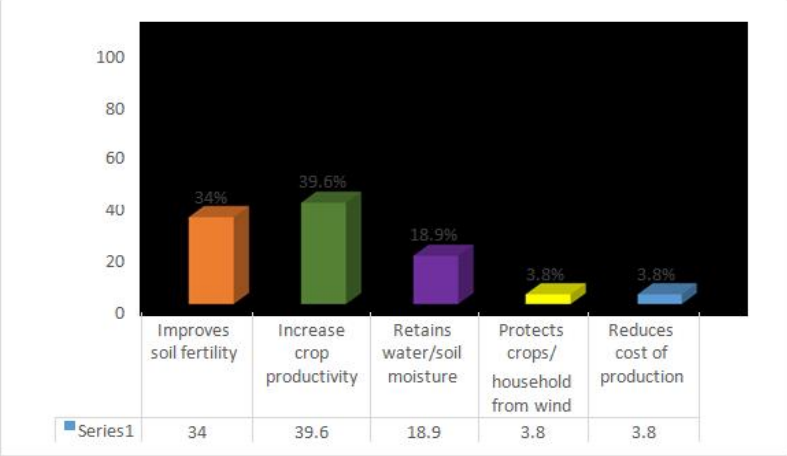

Fig. 1. Benefits of implementing adaptation practices by farmers

For instance, a farmer stated; I use to get 2 bags of maize from this 2 acres of land but since I was trained to leave my residue on the farm apply compost and farmyard manure, I now get up to 8 bags or more on this piece of land (Farmer 5 BAR). Another farmer reiterated; the maize seeds supplied are very good. The sun (drought) cannot destroy our crops when we use these seeds. I use to get up to 3 bags of maize when I was using my old seeds, now with these seeds, I get up to 15 bags of maize. I am able to pay for my children school fees, health and use some of the money to re-invest on my farm at the beginning of the new season (Farmer 6 NR).

4. CONCLUSIONS AND POLICY IMPLICATIONS

The study gives a different theoretical perspective on climate change adaptation among smallholding. Over the years, agriculturalists, academia and policymakers have placed a high priority on introducing climate change interventions in various communities and countries to lessen climate induced-agriculture impacts. Nonetheless, the role of farmer-based associations in climate change adaptation has been less examined [59,60]. Empowering farmer-based associations is paramount in creating an easy transfer of climate change adaptation knowledge and providing support for the attraction of more interventions. The paper explores the activities of peasant associations including their formation and organisation, membership and leadership characteristics, purposes of formation and challenges. This gave a deeper understanding of the activities and the contribution of associations to appropriate climate change adaptation. Farmers engaged in communal labour and also contribute a common fund to support farming activities, families and other community activities. Associations offer the opportunity for minority groups such as women and migrants to benefit from climate change interventions.

The existence of organised farmer groups facilitated easy understanding and implementation of adaptation practices; preparation and application of compost, residue management, row/distance planting, use of drought tolerant seeds, afforestation and crop rotation which benefited farmers in getting more yield and by extension being able to re-invest on their farms, pay children school fees and diversify into other livelihood strategies. Consequentially, peasant associations are central to climate change adaptation. Organisations interested in climate change adaptation should target and build the capacity of peasant associations for appropriate climate change adaptation. The Ministry of Food and Agriculture, Ghana should commit more financial resources into strengthening the activities of peasant associations for the successful achievement of adaptation targets.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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