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Full Length Research Paper

Harmonization of extension messages on climate smart agriculture in Malawi: Do we speak with one voice, and to whom?

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Poor access to extension services has been one of the major challenges that smallholder farmers in Malawi face. Dissemination of agricultural technologies is mainly done through field level extension workers and lead farmers; however, such workers are few in number. In addition to this, there is lack of harmonization of messages, approaches and methods in extension delivery at field level. Using baseline cross-sectional data, this study aims at contributing towards harmonization of extension messages and coordination of extension service providers in the implementation of climate smart agriculture technologies in Malawi. Existing information channels for disseminating climate smart agriculture and the capacity of extension workers and lead farmers were analyzed. Key study findings include poor coordination among stakeholders in the delivery, message package and incentive schemes; nonexistence of government approved climate smart agriculture specific training manuals among stakeholders; lack of knowledge and skills among field level extension workers in disseminating climate smart agriculture technologies; and limited access to knowledge and information by female farmers. The study recommends a harmonized and gender sensitive approach in extension delivery, coordination in the implementation of climate smart agriculture activities, and strengthening of District Agriculture Extension Committees for improved facilitation in extension delivery.

Key words: Extension, climate smart agriculture, smallholder farmers, Malawi.

INTRODUCTION

Agricultural support services such as access to extension, farm credit facilities and participation in functional markets, farmer associations, clubs and cooperatives have globally been touted to contribute towards improved farm level production and development of the agricultural sector (Maonga et al., 2017).

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These services tend to be very crucial especially in the successful development of smallholder agricultural sub-sector. In this sub-sector, smallholder farmers are generally characterized as a group possessing small landholdings for farming and with limited access to high productivity farm inputs such as fertilizer, hybrid seed varieties and improved breeds of livestock.

In Malawi, field experience has shown that extension is probably the commonest agricultural support service available and readily accessible by smallholder farmers. Access to agricultural extension by smallholder farmers in Malawi has been increasing gradually. National Statistical Office estimated that in 2005 only 13% of Malawi's agricultural households were able to access extension services (Agunga and Manda, 2014). In 2010, a countrywide study on adoption of metallic grain silos covering 10 districts across Malawi found that 47.4% of the sampled households had access to agricultural extension services (Maonga et al., 2013). In another country level study conducted in 11 districts on biofuel status in Malawi, 39% of the sampled smallholder farm households had access to extension, about 35% claimed affiliation with farmers' clubs, and only 4.6% had an opportunity to get farm credit facilities from formal lending institutions (Maonga et al., 2015; 2017).

Notable regional and global studies such as Ngomane (2006), Anderson (2007) and Zwane (2012) revealed that extension contributes to increased food production, through improved information dissemination, awareness of new agricultural technologies and technology adoption by farmers. Increased access to relevant agricultural extension messages is deemed to have positive influence on adoption of new farm technologies by farmers (Maonga et al., 2013; 2015). Agricultural extension also helps to liberate farmers from poverty; it serves as a catalyst for development in rural agricultural communities and collaborates farmers with researchers in agricultural development (David and Samuel, 2014).

Furthermore, shaped by the national agricultural development goals, the role of agriculture extension generally includes achieving national food security, improving rural livelihoods, and empowering natural resource management (Swanson and Rajalahti, 2010). On the environmental front, extension has been commended to play a pivotal role in addressing climate change issues by significantly contributing towards increased farmer awareness of the negative implications of the changing climatic conditions on farm productivity, and therefore the need for farmers to change farm management practices and adapt to climate change (Nhemachena and Hassan, 2007); farmers who are equipped with information about climate change are likely to have increased resilience to climate change shocks.

In Malawi, agricultural extension plays a facilitating role in the government efforts to achieve rural-based national development through increased farm productivity, improved food security and household income; extension also encourages farmers to take farming as business and thus, enabling them to participate in profitable agricultural enterprises leading to improved livelihoods (Malawi Government, 2012).

In order to widen access to extension services by farmers, the Government of Malawi introduced a pluralistic extension approach in 2002. However, the new approach brought mixed outcomes in the implementation of programs and projects in the agricultural communities. More farmers were and continue getting reached, but with poorly harmonized messages, approaches and methods. This has increased the workload on extension workers and lead farmers. It has further contributed to an information overload on smallholder farmers. Complicating the situation is the fact that female extension workers and lead farmers are few compared to their male counterparts in Malawi. This translates to limited access to new knowledge and information by women smallholder farmers. This is against the background that women in Malawi perform between 50 and 70% of all agricultural tasks, accounting for 70% of the country's labour force and the produced household food requirements, respectively. Such biases weaken capabilities of women to deal with socioeconomic problems and natural catastrophes such as climate change shocks whose impacts tend to be directly linked to gender differentiated vulnerabilities, coping and adaptation capacities and strategies (Women Environment and Development Organization (WEDO), 2010; Goh, 2012; Kakota et al., 2011; IPCC, 2014). Thus, women need to be empowered to enable them gain control over their destiny at personal life, community and society levels (Mare, 2017).

Constituting about 70% of the world's farmers and households living below the poverty line and also directly dependent on natural resources for their livelihood, women are more vulnerable to impacts of climate change and variability (WEDO, 2007; Goh, 2012; Agrawal et al., 2014). Therefore, unless gender inequalities are identified among climate-resilient interventions and gender needs addressed, development efforts will have marginal effects on livelihood improvement and solving food insecurity challenges. The 2013 to 2016 Malawi National Climate Change Programme advocated for gender responsive climate change policies and plans in order to build communities that are climate resilient. However, the gender gaps still exist in agricultural production; women continue to have poor access to and control over the means of agricultural production such as farm inputs, improved technologies, extension services, credit facilities and land (Kakota et al., 2011; World Bank, 2014). These factors reduce productive capacity of women and exacerbate their vulnerability to climate change shocks. Evidence shows that in Malawi, male-managed plots produce on average 25% more per hectare than female managed plots (World Bank, 2014). This is due to inadequate capacity among women, which

results from low access to extension services, education, information, and limited participation to local institutions.

The ability of women smallholder farmers to reap benefits from climate smart agricultural (CSA) practices will require institutional policy environment that is geared towards enabling women to have greater access to and control over appropriate agricultural technologies, information and financial support. Otherwise, poorly coordinated and lack of gender sensitive extension approaches will in the long-run reduce adaptive capacity and resilience of smallholder farmers to climate change and variability. This will likely contribute to environmental degradation, increased vulnerability and food insecurity.

The purpose of this study is therefore, to contribute to harmonization of extension messages and coordinate extension service providers in the implementation of CSA technologies in Malawi. The study pays particular attention to the analysis of existing information channels for disseminating CSA technologies as well as the capacity of extension workers and lead farmers in the dissemination of CSA technologies in Malawi through the case studies of selected three districts. The study is written with reference to the Malawi implementation plan for the National Agricultural Policy 2016, which particularly emphasizes coordination among all extension service providers and harmonizing extension messages on agricultural technologies amongst various extension service providers.

METHODOLOGY

Sources of data

This study is based on a baseline cross-sectional study. Data were collected from smallholder farmers and key agricultural stakeholders in three districts of Dowa, Nkhotakota and Phalombe between June and November 2015. The baseline study was the initial phase of the implementation of Capacity Building for Climate Change in Malawi (CABMACC) funded project titled “Framework for Enhancing Adaptive Capacity of Female Farmers to Climate Change” – Project Number CABMAC/001/01/2013.

Nkhotakota and Phalombe districts were identified from the six CABMACC priority areas. The two districts were selected because of their involvement in the previous studies on vulnerability to climate change such as the Climate Adaptation for Rural Livelihoods and Agriculture (CARLA). Dowa was identified from the districts where a collaborator to the CABMACC/001/01/2013 project, Development Fund of Norway, was implementing sustainable agriculture project using the lead farmer model. The choice of the districts was also based on the cultural and marriage beliefs that may have an influence in the access of resources, decision-making processes and adoption of CSA technologies. Geographically, all the three qualified as the right sites for implementation of CSA technologies.

Phalombe District is highly vulnerable to climate change effects especially floods owing to its hilly landscape with flood plains and undulating plateaus. The study was conducted in two Extension Planning Areas (EPAs) namely, Naminjiwa and Kasongo. The communities follow the matrilineal type of marriages where women are given preferences in the ownership of assets such as land because they remain in the villages while men migrate to other places to marry. In their culture, a woman has control over children and in the case of divorce the children stay with the mother. This type of marriage system tends to influence the uptake of technologies and other interventions that can enhance adaptive capacity by female farmers or otherwise.

Nkhotakota District is generally flat but also vulnerable to climate change effects such as dry spells and strong winds. Being along Lake Malawi lakeshore, communities in Nkhotakota depend on fishing besides agriculture for their livelihood. The study was conducted in Linga EPA where CABMACC projects are being implemented. Unlike Phalombe, communities in Nkhotakota follow a patrilineal system of marriage where men are given preferences over ownership and control over productive resources such as land. Polygamy is also common in Nkhotakota especially among the Muslim communities in the district and the study area in particular. These cultural and marriage beliefs have also an influence over adoption of CSA technologies.

Dowa District is geographically hilly. Communities in Dowa District generally practice patrilineal system of marriage just like Nkhotakota. Chibvala EPA, where the Development Fund of Norway has been implementing activities, attracts increased number of projects and trials on sustainable agriculture. The EPA is accessible by most of the non-governmental organization because of its proximity to Lilongwe, the capital city of Malawi. It was therefore, better placed for sharing experiences and lessons on CSA technologies.

Data were collected through desk study and field survey. Desk study involved a thorough review of existing training documents on CSA and extension delivery in Malawi and the international community in order to identify gaps in literature. Using checklists, key informant interviews were conducted with Ministry of Agriculture, Irrigation and Water Development through the Department of Agricultural Extension Services, and the Department of Land Resources Conservation; and also from non-governmental organizations, such as Self Help Africa, Farmers Union of Malawi, National Smallholder Farmers Association of Malawi, Evangelical Lutheran Church of Malawi and the Development Fund of Norway. Through plenary sessions, a knowledge gap analysis was conducted with selected participants drawn from extension offices in Nkhotakota, Dowa and Phalombe districts in order to capture training needs of the field level extension workers and lead farmers.

In a field survey approach, the study used a semi-structured questionnaire to collect primary data at smallholder farm household level through a series of oral interviews between trained enumerators and household head and/or spouse. Smallholder farmers were targeted because they are in a majority in Malawi’s agricultural sector; and also because a farm household is considered as a decision-making unit (Maonga et al., 2015).

The baseline study covered a sample of 138 smallholder farm households drawn from the three districts (37 from Dowa, 51 from Nkhota kota and 50 from Phalombe) through multi-stage sampling procedures. From the sample, 105 were male-headed households while 33 were female-headed households. However, 90 respondents were females while 48 were males because gender project female respondents were selected from both male-headed and female-headed households. The sample size was calculated using the formula presented in Equation 1.

$$n = [\{z^2 (1 - p)p\}/e^2] \quad (1)$$

In equation (1), n is sample size, p is estimate of the percentage population, e is acceptable sampling error, and z is the desired level of confidence (1.96 at 95%). The study was considered as sub-national, therefore, the desired allowable sampling error was within 0±10% which translated to (0.1) in the equation; an estimate of 50% or 0.5 was used because there were no previous estimates of the population proportion in the three districts on related studies.

The sample size was different in each district but the total

number per district exceeded 30, which is a recommended minimum sample size that allows drawing of basic inferential statistics whenever necessary. Smaller samples of this nature were appropriate for this study because the research was mainly qualitative in nature with a strong focus on an in-depth inquiry. With the indicated measurements (*e, p, z*), the formula would generate a sample size of 96 households.

However, the sample was increased to 138 in order to take care of non-responses and field errors and also to increase representativeness in the selected Extension Planning Areas drawn from the three districts.

The first three stages involved selection of districts, extension planning areas, traditional authorities and villages. Finally, using random tables obtained from district agriculture offices, households for interviews were selected from a list of villages through simple random and proportional probability sampling techniques in order to have proportionate representation of sub-samples across villages. In a form of triangulation, primary data were also collected through focus group discussions conducted with groups of smallholder farmers ranging between 8 and 15 members per group drawn from the sampled households. Focus group discussions were intended to capture in-depth qualitative data which would otherwise not be possible to collect through questionnaire administered survey; it also served the purpose of triangulating the questionnaire generated quantitative data.

Data analysis

In line with the objectives of this study data were analyzed using Statistical Package for Social Scientists version 20 and reported through descriptive statistics (percentages, means and frequencies). Therefore, the findings presented in this study are based on analysis of existing information channels for disseminating CSA technologies and capacity of extension workers and lead farmers in the dissemination of CSA technologies.

RESULTS AND DISCUSSION

The study generated two key findings based on the objectives of the study, and raised four critical issues that policy makers ought to pay attention to in the implementation of CSA technologies and practices in Malawi.

Existing information channels for disseminating CSA technologies

The common channels for disseminating CSA were extension workers (Government and NGOs), lead farmers, radios, village meetings, field days and demonstration plots. Government extension workers and lead farmers combined were found to be the main channel of communication for disseminating information of CSA technologies and practices.

However, it was noted that there were few extension workers against the number of farmers, and some sections had no extension workers at all. As a result, farmers relied on lead farmers because they were available almost in every village. In general, the results show that women in female-headed households had low access to the common channels of communication such as radio and cellphone. Only 33% of the respondents in female-headed households owned a cellphone as compared to 59% of the respondent in male-headed households.

Similarly, more male-headed households (70%) than female-headed households (24%) owned a radio. This implied that very few women in female-headed households accessed messages sent through cellphones and radio. When disaggregated by districts, the results showed that 64% of the respondents in Phalombe owned a radio followed by 63% in Nkhotakota while in Dowa 49% owned at least a radio. It was also noted that more respondents in Nkhotakota (58%) owned a cellphone followed by Dowa (57%) and the least was Phalombe with (46%).

Although, cellphones were used to communicate messages, it was observed that none of the messages received was related to CSA technologies. Most of the messages (52%) were related to social issues while only 7% of the messages received on radio were related to agriculture. The results also showed that 65% of the respondents in male-headed households could read and write as compared to only 36% of the respondents in female-headed households. As such, if the information were presented in a written form, very few female farmers would be able to read.

Phalombe had a highest percentage of respondents who could read and write the local language, Chichewa (70%) followed by Dowa (68%) and the least was Nkhotakota (41%). These findings provided an indicator of the channels that could be used to disseminate CSA technologies in each of the districts. It is also important to note that through focus group discussions the study revealed that “all the lead farmers could read and write and had a cellphone and a radio in possession,” which they used to bridge the communication gap.

Capacity of extension workers and lead farmers in disseminating CSA technologies

Qualitative findings from extension workers revealed that generally, they had little knowledge on the new agricultural practices such as CSA technologies because their formal training did not cover such technologies. It was noted that there were opportunities to attend trainings on new agriculture practices but only a few extension workers were selected to attend a particular training. Extension workers gave each other turns to attend the training; this implies that that one extension worker might not have acquired the required knowledge and skills of all the new practices.

The study also revealed that sometimes extension workers got mixed information on a particular technology from different trainers especially government versus non-governmental organization (NGOs). As such they got confused on the appropriate knowledge and skills to

disseminate to lead farmers and follower farmers. The extension workers also complained of the short duration of the training against the volume of work that was covered. Time was inadequate to learn a technology and put it into practice. It was reported that on average, training took two days including field visit and demonstrations. There was a suggestion of extending the duration of training to at least five days.

The discussions also revealed that there were no resources at the EPA level for conducting activities that will promote sharing of information and experiences after the action points developed during trainings. It was also noted that there was a training manual for training extension workers that was developed by the Department of Extension Services through the Ministry of Agriculture, Irrigation and Water Management; however, the information on Climate Smart Agriculture was very scanty in the manual. There was need to update the manual and include the detailed information on CSA technologies and other new practices that enhance farmers' adaptive capacity to climate change.

On the other hand, the discussions with lead farmers highlighted the challenges that they faced in providing extension services to farmers. Most of them had never attended any training apart from a one-day meeting that they sometimes attended at the EPA. There were no reference materials that they used as lead farmers, and that whatever they shared with farmers, came from their heads out of experience. There was also a problem of transportation to reach out to farmers owing to the fact that most of the lead farmers did not own even a bicycle though some of the follower farmers stayed far. It was observed that lead farmers were doing most of the work in providing extension services because of the shortage of extension workers especially in rural areas. For example, Chisoti Section under Linga EPA had no government extension worker and as such, farmers relied on the lead farmer for extension services. However, it was clear from the lead farmers that they had very little knowledge on the CSA technologies. Therefore, their capacity to train farmers was very low. Discussion with smallholder farmers also revealed that sometimes farmers did not trust the lead farmers because the latter tended to have lower knowledge on technologies and limited skill in demonstration plots.

Critical issues from the key findings

From the two key findings of the study, this paper further discusses four critical issues whose implications would potentially improve or hinder successful implementation and delivery of agricultural extension in general and adoption of CSA technologies in Malawi. Addressing these critical findings successfully would in principle lead to enhanced resilience to climate change shocks and improved food security and livelihoods among smallholder farm households in Malawi.

Lack of a common understanding of Climate Smart Agriculture

Focus group discussions with extension workers from Dowa, Phalombe and Nkhotakota districts revealed a lack of common understanding of CSA. There was a misconception of the difference between CSA and Conservation Agriculture. Another critical finding in this aspect was the poor coordination among stakeholders promoting and implementing CSA technologies. The stakeholders implementing CSA used different methodologies and training manuals with different messages on the same technologies. There was also inadequate harmonization of activities between NGOs and government, which led to dissemination of conflicting messages to farmers. It was further found that the NGO community introduced different incentives to government extension workers, lead farmers and farmers. This unfortunately led to abandonment of own work in favor of project activities, as well as deliberate duplication of interventions within the same impact areas with minimal progress on the ground. Furthermore, such an incentive scheme tended to create dependency, which eventually stood as a challenge for long-term sustainability of agricultural production and extension service delivery.

Non-existence of government approved CSA specific training manuals among stakeholders

The organizations that have been promoting CSA technologies in Malawi used generic agricultural training manuals to train extension workers and lead farmers. These manuals mainly contained parts of CSA technology messages, thereby making it difficult for extension workers and lead farmers to understand the process of implementing them. This affected quality and relevance of messages in addressing CSA technologies. In addition, there were no reference materials to guide lead farmers in disseminating CSA technologies. As such, most of what the lead farmers shared with their follower farmers came from their own memory and experiences.

Limited knowledge and skills among field level extension staff about CSA technologies

There were training gaps in CSA technologies in content, delivery and context leading to inadequate knowledge and skills among extension workers and lead farmers. There was no continuity in the participation of extension staff in training programs organized by projects, as extension workers gave each other turns to attend

training sessions. In this manner, extension workers failed to acquire a full package of knowledge and skills as designed by the training program. In this case, extension workers might not have gained the expected appropriate knowledge and skills to disseminate CSA technologies to lead farmers and follower farmers. Related to this, the EPA level had inadequate resources for conducting activities to promote sharing of information and experiences. These problems combined have serious negative consequences on the efforts to promote CSA technologies.

Few female extension workers and lead farmers affect CSA uptake

It has been noted that gendered constraints are affecting Malawian women smallholder farmers' uptake of CSA technologies. Women smallholder farmers prefer to get CSA messages from female extension workers, and lead farmers. However, there are fewer female extension workers and lead farmers in rural areas than their male counterparts. It was observed that women smallholder farmers have less information about CSA technologies than the male farmers. Limited land use rights, access to inputs, extension services and knowledge on CSA technologies are major constraints for adoption among women smallholder farmers in Malawi. It would be unrealistic to claim improved adoption of CSA technologies without properly addressing these contestations. Therefore, it is necessary to rethink about doing something to improve agricultural extension that currently does not provide equal rights to extension services to men and women smallholder farmers. The agricultural extension system should design a program that particularly addresses female extension agents and lead farmers to reach rural women in both male-headed and female-headed households.

CONCLUSION AND POLICY RECOMMENDATIONS

From the study findings, this study concludes that poor coordination among stakeholders in the delivery, message packaging and incentive schemes in addition to lack of government approved CSA specific training manuals have led to conflicting messages on CSA technologies among stakeholders and poor adoption of technologies among farmers in Malawi.

CSA is a new concept among most field level extension staff and the content may not have been covered during the previous extension training. The study also observed that there are inadequate training sessions to equip field level extension workers with appropriate knowledge and skills. As a result, most of the field level extension staffs have gaps in knowledge and skills to disseminate CSA technologies to lead farmers and follower farmers. If not addressed, these findings have serious implications including poor adoption of CSA technologies, particularly among female smallholder farmers, and may contribute to low adaptive capacity and exacerbate household food insecurity in Malawi.

Based on the findings and conclusions, the study recommends that there should be a harmonized approach and coordination in the implementation of CSA activities amongst different stakeholders in the country. On this issue, emphasis should be placed on strengthening district agricultural extension committee, which actively serves as overseer of agricultural activities at district level. We would also like to recommend that government approved CSA specific training manuals should be developed and made available for use in all EPAs in the country. These should serve as blue prints to be used by all stakeholders with intention to promote CSA in Malawi. Few modifications must of course, be allowed to accommodate area specific geographic and climatic differences that exhibit variations in agricultural production across the country. The agricultural extension system should design a program that particularly addresses female extension agents and lead farmers to reach out to rural women smallholder farmers.

Furthermore, the study recommends re-tooling of extension workers on CSA as well as increased training of lead farmers to ensure that they acquire up-to-date knowledge and skills required in the implementation of CSA technologies. Last, but not least, we recommend that improved and updated reference materials on CSA should be developed and provided to lead farmers and follower farmers in local language(s) to guide their use when working with other smallholder farmers in the respective farming communities in the country.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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