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MZUZU UNIVERSITY, PRIVATE BAG 202, LUWINGA MZUZU 2.

RESEARCH PAPER TITLE: INSTITUTIONAL ARRANGEMETS AND ADAPTATION OF CLIMATE CHANGE MITIGATION PRACTICES IN BOLERO-MALAWI¹

STUDENT NAME: GIFT CHIWAULA LUWE²

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ABSTRACT:

This study set out to understand reasons smallholder farmers in Bolero fail to uptake expert advice from institutions in mitigating adverse effects of climate change. The study also attempted to understand reasons for local institutions failure to enhance local people adoption of climate change practices and in coordinating communities' efforts in climate change mitigation. Thus, the study revolved around such research issues as; what are the reasons for communities and farmers failure to adopt climate change mitigation practices, why farmers relapse into their old farming practices after projects phase out. Other research issues explored in this study included how local institution engage with and facilitate local people's efforts in climate change mitigation in Bolero. The study used household survey to gauge farmers understanding of climate change and its effects on livelihoods, and what they do to mitigate the adverse effects. Key informant interviews were conducted with experts in climate change mitigation in the district. Focus Group discussions were organized to triangulate information obtained through household survey and key informant interviews. Data from the study suggest that although smallholder farmers in Bolero are engaged in a number of climate change mitigation initiatives, adoption of mitigation practices has remained elusive, rendering farmers vulnerable to adverse effects of climate change. Climate change mitigation efforts in this area remain uncoordinated with existing local institutions failing to properly engage with other structures of the local government at district level to bring about sustainable transformation of livelihoods. The paper has acknowledges huge resources that have been channeled towards climate change mitigation initiatives including building capacity of local institutions for coordination of communities climate change mitigation efforts in Bolero. The study found out that despite these huge investments in climate change mitigation projects; climate continues having a serious negative toll on the livelihoods of many farmers in the area. Uncertainties in changing temperature patterns, ultra violet radiation levels, rainfall and wind patterns continue posing a major challenge to livelihoods for the rural poor in the area. The study concludes that unless smallholder farmers uptake advice from institutions on climate change adaptation and local institutions are capacitated to enhance community level adoption of climate change practices, coordinate and sustain communities' climate change initiative, communities in Bolero will continue living under perpetual states of poverty, hunger and acute malnutrition.

INTRODUCTION

Agricultural production remains the main source of livelihood for rural communities in Malawi. In Bolero, a recent study by Mzuzu University (TEN Project: 2013) shows that, more than a third of the households earn their livelihoods from agriculture.

Projections suggest that by the end of the 21st century, climate change will have had substantial impact on agricultural production and on the scope of poverty (Slater *et al*, 2007). This year (2015) in Malawi as a result of adverse impacts of extreme weather and climate variability floods affected one million people from 15 of the country's 28 districts. 230,000 people got displaced and 106 people got killed with 172 others reported missing (The Nation, May 2015). In 2001/2002 drought hit most parts of the country and left over 3 million people hungry (Malawi Government: 2002). Thus, for 15 years there have been not less than 6 episodes of drought affecting agricultural production according to a scoping study by Christian Aid. The report also indicates that over the years rains have been erratic with frequent dry spells. For Bolero, the table below shows the in some years below normal rains were received with 2010 and 2015 having been the driest years.

Table 1: Bolero rainfall pattern over 5 years

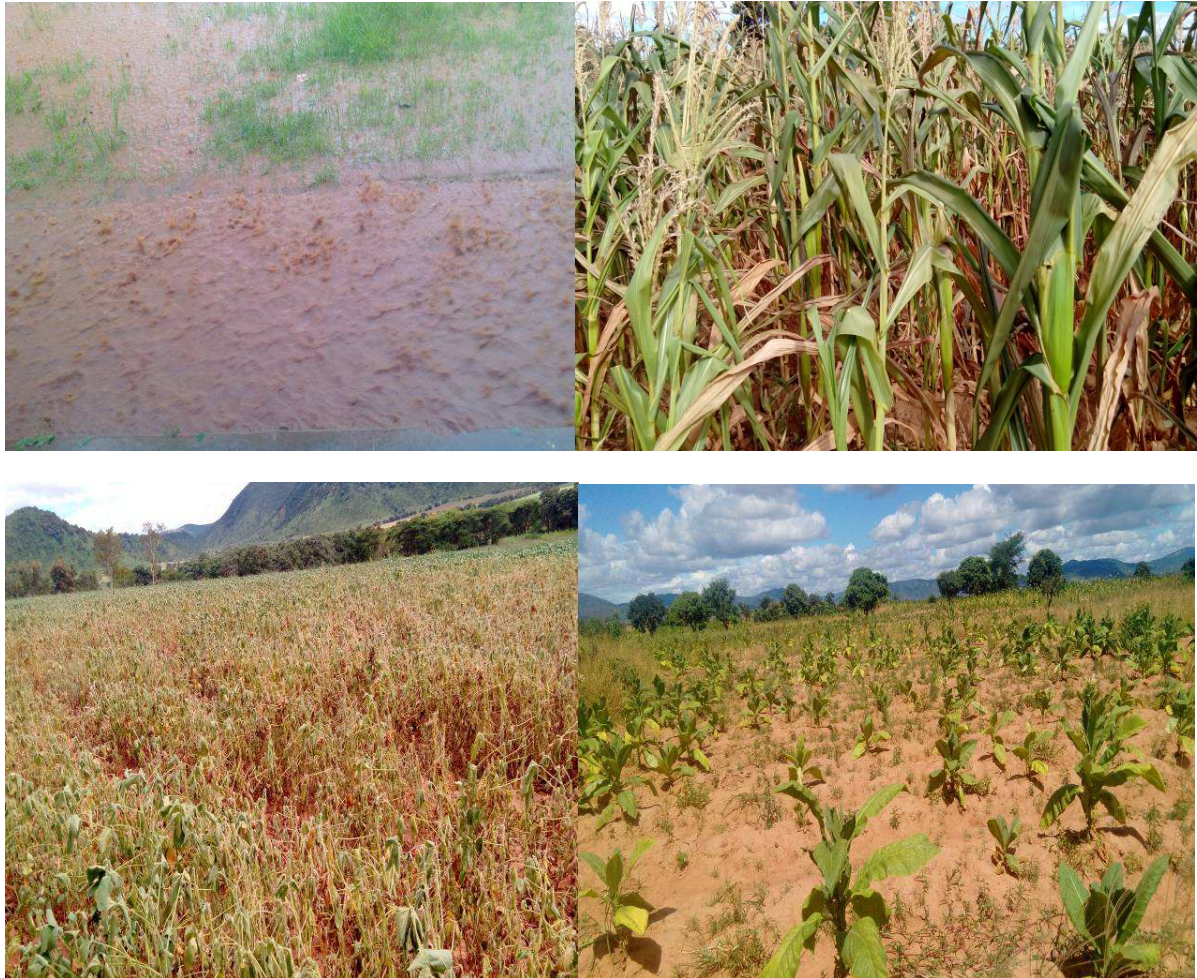
Year	Annual Rainfall (mm)
2006	742.5
2007	694.7
2008	765.1
2009	655.9
2010	520.9
2015	531----

Source: Bolero Metrological Office

Data from the metrological office in Bolero as presented in the table above confirms that the area is receiving less and less rainfall. Sometimes very heavy rains fall over a short period of time and dry off well before crops mature leading to low harvests and therefore food insecurity for most households. Thus, communities and smallholder farmers in Bolero continue being

exposed to climate change effects such as droughts, hailstorms, floods, etc. which affect crop yields, food security, nutritional status and consequently their livelihoods.

Fig. 1: Rainfall patterns and how they have affected yields in Bolero in 2015: Top right -heavy falls and surface run off in mid February, left – maize wilting at cob forming stage Mid March. Below - Major cash crops (tobacco and soya) equally affected.



Climate change is affecting rainfall amounts, distribution and intensity in the area which in turn affects timing and duration of growing periods. For this year for example Bolero has had only 58 days of rainfall far below the requirement of the most fast maturing maize variety preferred in the area – SC 403 – locally known as Kanyani with a maturity period of between 75 and 90 days. Yields are getting less, leading to serious food insecurity and malnutrition. The TEN Baseline Study shows that 58% of the population understands that irregular rainfall or dry spells being

experienced in the area is a consequence of climate change and that the food insecurity situation is directly linked to this phenomenon. This study finding suggests that knowledge in climate change mitigation practices acquired overtime by the community members is not significantly transforming the Bolero community and not enabling them to effectively cope with the adverse effects of climate change and sustain livelihoods.

On the assumption that community members tend to have inadequate capacity to mitigate and cope with adverse effects of climate change, a number of Non-Governmental Organisations (NGOS) and government departments have come to work in Bolero to help smallholder farmers cope with adverse effects of climate change and resultant extremes such as floods, hailstorms, drought and cold temperatures among others. Using local institutions, they teach climate change mitigation practices to smallholder farmers in the area. The government through its departments such as Ministry of Agriculture- District Agriculture Development Office (DADO), Department of Forestry, and Department of Disaster Management and others run programs and projects aimed at helping communities cope with adverse effects of climate change. Both NGOs and government are investing in strategies/practices aimed at helping smallholder farmers moderate potential adverse consequences of climate change. Such innovations and technologies as switching to use of hybrid varieties in the face of shorter growing seasons, use of water harvesting tanks to store rain water for irrigation and domestic use, intensive farming practices such as sasakawa planting instead of planting three seeds per station, among others have been introduced in the area over the years. Conservation/smart agriculture encompassing such innovations as zero tillage, pit planting, mulching are also being piloted in attempt to conserve the much needed moisture to sustain crop life during prolonged dry spells while agro forestry is being championed to replenish the degraded soils and increase crop productivity.

The debate on the effectiveness of these technologies are in climate change mitigation is beyond the scope of this paper however it is sufficing to note that in the short term, there are usually high levels of adoption of these strategies among participating communities and smallholder farmers as projects are implemented. As to what motivates this level of adoption during the course of project implementation and not thereafter remains subject of perhaps another study but noticeable in Bolero is an observation that after projects phase out, farmers reverts to their old ways of farming. It is not uncommon to see farmers relapsing to planting local varieties of crops instead of hybrids, abandoning the sasakawa for the traditional three per planting station and turning their conservation fields/zero tillage into the traditional tilling and ridging among others. These tendencies suggest despite the huge investments in climate change mitigation projects by both government and NGOs, in the long run efforts in climate change mitigation/adaptation do not yield the intended transformation, that is, building communities resilience to adverse effects of climate change and improving their livelihoods.

In order to enhance communities and farmers adoption of climate change practices, coordinate climate change mitigation initiatives and promote community development generally, both government and NGOs have created and are working through structures at local level in various names as follows; Project Implementation Committees (PICs), Village Natural Resources Management Committees (VNRMC), Village Civil Protection Committees (VCPC), Village Development Committees (VDC)), Area Development Committees (ADC), depending on their orientation. While both government and NGOs seem to agree that working through local institutions accelerate local level adoption of climate change mitigation practices, influence different groups to gain access to and enable them effectively use available resources for local level adoption of climate change mitigation, local institutions in Bolero seem unable to effectively play this role. Available data suggests that initiatives in climate change mitigation remains as isolate episodes, uncoordinated and loosely connected if at all to local government structures for their sustainability after projects phase out.

While the role of local institutions is broadly accepted in many analyses of climate change and adaptation and community development (Batterbury and Forsyth 1999, Thomson et al, 2006, Young and Lipton 2006), in Bolero, local institutions seem yet not ready to take on this challenging responsibility. Specific studies focusing on themes such as water conservation, rural livelihoods, forest governance (Adger: 2006, Droogers: 2004, Naess 2005 Shepard 2006) have all identified local institutions as key to climate change mitigation and adaptation. These scholars argue mostly that local institutions mediate between individual and collective responses to climate impact thereby shaping outcomes of climate change interventions. In Bolero though, local institutions seem not able to form that key locus of a multifaceted climate mitigation process that would be key not only to accelerate adoption but also act as locus of coordination of climate change mitigation efforts and to maintain that degree of social coherence and continuity of all community efforts in climate change mitigation.

Second and more importantly, it is argued that local institutions pull individual efforts into collective efforts towards mitigating adverse effects of climate change. That local institutions harness communities' efforts in all initiatives and will propagate ownership of all initiatives and therefore sustain operations even after the project resources run out. To what degree this is true for Bolero is the subject we seek to pursue and present in the subsequent sections.

PROBLEM STATEMENT

In Bolero, huge resources have been channeled towards climate change mitigation and initiatives. Each year millions of dollars are spent on climate change mitigation projects by both government departments and Non Governmental Organisations. Millions of dollars are spent on forming and building capacities of local institutions as a sustainability strategy to continue

the coordination of climate change initiatives after projects phase out. Despite all this, adoption of climate change practices by communities in Bolero has remained dismal. Where communities have seemed to adopt climate change strategies that has remained and continue being tied to the time when projects are running. Smallholder farmers relapse to their old ways of farming soon after projects phase out. Local institutions formed and capacitated to help farmers and communities to adopt and sustain climate change initiatives among smallholder farmers seem not able to achieve consistency and predictability in their performance after projects phase out. Thus, contrary to the common belief that with the knowledge gained and skills acquired, local institutions will help farmers adopt climate change mitigation practices and sustain operations after projects phase out; in Bolero these have hardly sustained communities' efforts in climate change mitigation. They hardly sustain changes in climate change mitigation as initiated by projects. Local institutions seem to be failing in their coordination role and are unable to effectively engage with other stakeholders including district structures and government extension staff to sustain initiatives in climate change mitigation.

Consequently, communities in Bolero have continued suffering from the adverse effects of climate change. They have continued leaving in the trauma of droughts, floods and hail storms that frequently hit this area as has been the case this year where 76 households are currently living a state of dire need after a devastating hailstorm destroyed their homes and pulled down school blocks in Bolero Extension Planning Area (Malawi Government - 2015). The food insecurity situation as highlighted in the preceding paragraphs, has remained perpetual stunting³ and underweight⁴ especially among children of ages 5 to 10 years are currently at 30% and 18% respectively (MDHS:2004)

Overall Objective

To understand reasons communities and smallholder farmers in Bolero fail to uptake and sustain climate change mitigation practices, and easily slip back into their old ways of farming when climate change mitigation/adaptation projects phase out. The study also wanted to understand reasons why local institutions are unable to help farmers and communities adopt and sustain practices in climate change mitigation after projects phase out.

Specific objectives of the study were:

- To review literature surrounding climate change mitigation among smallholder farmers

³ Defines that percentage of children 5-10 years who are too short for their age

⁴ Refers to a state of being acutely malnourished

- To understand reasons smallholder farmers do not uptake advice from institutions on climate change mitigation, where they seem to, seek explanations for their easily relapsing to their old ways of farming after projects phase out
- To analyse how local institutions in Bolero act with communities in enhancing adoption and sustaining climate change mitigation practices.
- To make recommendations based on the findings of the study on how smallholder farmers in Bolero can be bailed out of the trap of the adverse effects of climate change and how their efforts in climate change mitigation can be sustained.

Research Questions

The study was organized around the following research questions:

1. What has been the effect of climate change on local farmers in Bolero?
2. What mitigation measures have been put in place to help farmers cope with adverse effects of climate change?
3. How have local farmers responded to expert advice on climate change mitigating practices?
4. What transformational pathways can be traced in Bolero community's climate change mitigation practices and behavior?
5. What needs to be done to ensure continued adaptation to adverse effects of climate change and transformation of the Bolero community?

LIMITATIONS OF THE STUDY

This being an academic piece of research it has been limited by prescriptions of the study program such as the time within which to complete the study. This has been compounded by the word limit put forth as a requirement in the guidelines. Per se, this limited the depth and breadth of the study and indeed the depth with which issues can be discussed and presented herein. During the field research we also encountered respondents' "burn out". There are many students currently carrying out their studies in Bolero from various organisations and academic institutions including Lilongwe University of Agriculture and natural Resources (LUANAR), Mzuzu University including the thirteen TEN Masters students. Respondents showed signs of wear and tear during interviews and discussions. This respondents fatigue may to some degree compromise authenticity of the findings of our study. Having conducted the study during a time when a the area has experienced a dry spell and consequently food insecurity, respondents

could from time to time seek solutions that could bring them immediate relief to the current situation, that is, food insecurity than the broader picture that was required by the study. Some respondents likened this study with the Malawi Vulnerability Assessment aimed at establishing the degree of vulnerability of households to the disaster. Thus, in most cases they had to present their stories to suit the requirement of such an assessment. The researcher had to rely on prepared checklists to ensure that the data collected does not deviate much from the broader research themes.

LITERATURE REVIEW

Though climate change has impact across the globe, developing countries are more vulnerable to its impact because they have low capacity to cope (Mirza 2003; Mendelsohn et al. 2000). Literature on climate change mitigation seem to suggest that because communities in developing countries are heavily dependent on climate-sensitive resources like forests, agriculture and fisheries and yet they have less capacity to mitigate effects of climate change, they become more vulnerable to the effects of adverse effects of climate change (Mendelsohn, et al. 2006; Mirza 2003). The effects of climate change are most pronounced among the poor and marginalized communities (Rodima-Taylor et al. 2011).

Poor households and communities have historically attempted to mitigate adverse effects of climate change through many different strategies, their capacity to cope has depended significantly on the way institutions regulate and structure their interactions: both amongst themselves and with external actors. Literature suggests that successes in communities and farmers mitigating adverse effect of climate change depend on specific institutional arrangements. As Agrawal contends, climate change mitigation never occurs in an institutional vacuum. They all, thus, depend on clear property rights and other institutions that regulate access to resources and exposure to risks (Agrawal: 2008).

Indeed, the role of institutions at multiple scales, including local contexts, is broadly accepted in many analyses of climate mitigation (Batterbury and Forsyth 1999, Thompson et al. 2006, Young and Lipton 2006). Specific studies focusing on themes such as water conservation, agricultural development, rural livelihoods, forest governance (Adger 200b, Droogers 2004, Naess 2005, Shepherd et al. 2006, Ziervogel 2003) have all identified local institutions as being key to climate change mitigation and yet, relatively little of the existing work has undertaken a careful or systematic analysis of the different types of institutions relevant to climate hazards-related mitigation the different roles of local institutions in the context of adaptation, or the features of institutions most important for successful climate mitigation in rural contexts in the developing world (but see Bakker 1999, Tompkins and Adger 2004).

Thus, despite the importance of the role that local institutions play and the impact of institutional arrangements on climate change mitigation as highlighted in the preceding paragraphs, the subject – institutional arrangements and their role in fostering climate change mitigation in communities has been tangentially tackled in many studies in Bolero specifically and Malawi generally. But as Charles notes, in addressing adverse effects of climate change, it is imperative that a multi-sectoral approach is taken, beginning at the community level with the smallholder farmers who are directly affected by climate change (Charles: 2008). More critical is to understand the impact of institutional arrangements in climate change mitigation and how gains realized through projects interventions could be sustained beyond projects life span. This paper is thus set against that background and an understanding that addressing adverse effects of climate change and sustaining the gains realized through various initiatives is highly local, and that its effectiveness depends on local institutions through which incentives for individual and collective action are structured.

In different parts of the world, many rural communities already experience high levels of climate variability and have developed more or less effective responses to address such variability. Much of the Sahelian region, for example, faces extreme irregularity in rainfall with recurrent droughts. A number of scholars have argued, based on available data, that annual rainfall levels in the region have declined together with an increase in inter-annual and spatial variability as well as the intensity of drought events (Hulme et al, 2001, Tarhule and Lamb 2003). In response, farmers have adapted their farming, livestock rearing, and other income generating activities to achieve some degree of sustainability in their livelihoods (Blanco 2006, Nyong et al. 2007).

In Trinidad and Tobago with impending climate change, existing conflicts were becoming more intense. In the Buccoo reef area of Tobago, institutions prior to the 1990s were relatively exclusionary, and conflicts between development and environmental imperatives proved difficult to resolve. Action research in 1997-2000 was followed by a process of deliberation and learning in which various stakeholder groups came together for discussion, engagement, data collection, and information sharing so as to develop effective strategies to reverse ongoing environmental deterioration. The creation of an informal group led to greater communication and small behavioral modifications such as more careful use of oil in boats to reduce spillage, launching of an information campaign, and increased community outreach. Joint action also led to greater leverage in interactions with government officials and agencies. At the same time, government officials found the group an effective partner in introducing changes in coastal management practices. This case highlights the importance of inclusionary communication and deliberation, institutionalized mechanisms for social learning, and communication and resource flows that connect local and external actors. These developments have increased community

level resilience and helped local groups address risks of climate change flexibly (Tompkins and Adger 2004).

The Nam Think Forest Protection Team of Central Vietnam also presents a typical case of where institutional arrangements sustained projects initiatives in climate change mitigation and brought about lasting change in the livelihoods of participating households. The Provincial Red Cross with support from the Danish Embassy rehabilitated the mangrove forest in Tien Hai District from 1998 to 2005. A study of this case shows an approach where newly planted forests were given to households from the forests' surrounding areas at low fees. A forest Protection Team was established with membership drawn from participating households. After the Provincial Red Cross withdrew its support, the Forest Protection Team started operating under the direct supervision of the village/communal team. The commune team drew its budget from the state under a program managed by the District Economic Division⁵. Working under such arrangements communities were able to restore their once degraded forests which have existed to date.

Case studies as presented above are indicative of some success stories where local institutions effectively facilitate communities' adoption of climate change mitigation practice and coordinate and sustain community efforts to bring about the required transformation and resilience to shocks that come with adverse effects of climate change. They showcase viable transfer of authority and responsibility that lead to the sustainability of an initiative started by a project, owned by the people themselves under the established local government structures. To what extent this is true about Bolero forms the thrust of this study. Thus, in the subsequent sections, the paper turns to present the Bolero scenario from the field study carried out in three sections of the EPA. First a description of the methodology and tools used in collecting data in the field study area to inform finding presented herein.

METHODOLOGY

In order to generate data to inform this study, the researcher gathered both quantitative and qualitative data from three sections of the Extension Planning Area (EPA) as follows: Bolero A, Bolero B and Bata. Aware of the limitations to the study outlined above the researcher confined the study to only three of the many sections in the Extension Planning Area. The researcher was also limited in terms of the sample size to work with given limited time available for the study. To wane off unnecessary expectations from the respondents in the face the food insecurity situation that has hit the area, the researcher limited the interview time spent with

⁵ Adapted from Le, T.V.H and T.H Daos, "The Evolution of Forest-Related Institutions and Associated Forest Dynamics in Commune of Central Vietnam" A paper presented at the International Scientific Planning Committee of the 6th Opening Meeting, University of Bonn, Germany, October 9-13, 2005.

respondents or groups and as individuals. A variety of research methods were employed to ensure that relevant and adequate data was collected to inform findings in this study especially in the face of challenges highlighted in the preceding paragraph. Data gathered was adequately triangulated using the variety of methods employed as below to remove possible biases and unnecessary expectations that arose from situations surrounding respondents, that is, dry spells and consequent food insecurity that has hit the area of study. The following research methods were employed in the study:

Key Informant Interviews (KIIs) - using this qualitative method, the researcher gathered qualitative information from community group leaders, government and NGO agencies and Village Development Committee (VDC) leaders. 8 key informants were interviewed to give the researcher expert opinion in the study topic (Education Development Centre Inc. 2004). The researcher also interviewed district council authorities (The Director of Planning and Development (DPD), the District Disaster Management Officer (DoDMA) and The District Forest Officer (DFO) to understand the activities and mandate of their institutions and the role and linkage with local institutions in facilitating communities' efforts in climate change mitigation/adaptation. This method also helped the researcher to explore in depth the climate change situation in Bolero – initiatives, practices being implemented to help communities mitigate the adverse effects of climate change. It also helped to explore in depth reasons for non adoption of the practices among farmers and why farmers were relapsing back to old ways of farming after projects phase out.

Focus Group Discussions (FDGs)-5 were conducted in the three sections of the EPA. This involved farmer representatives, local leaders and leaders of local institutions. At the VDC level, the focus group discussion involved local leaders and VDC representatives; while as at district level, the FDGs involved leaders and Managers from NGOs, Rumphu District Council Officials; including the Director of Planning and Development (DPD) and officials from government departments working on climate change mitigation in Bolero. FDGs helped the researcher to gather information and insights into actual climate change situation in the Bolero and the district overall (OMNI Research and Training Centre Inc. 1996). The researcher got diverse opinions and ideas on why farmers fail to uptake advice from institutions and the role of the district structures in coordinating climate change efforts in the EPA and the district. The researcher was mindful of such shortfalls of this method such as possibility of facilitator's bias which was overcome by recording all FDGs for later reference where possible biases could be checked. To ensure that there was as little digression from the topic under study because of circumstances under which the study was conducted and by domination by the most vocal, the researcher timed the FGS and limited them to not more than an hour each. The checklist of

questions prepared before- hand helped the researcher remain in focus in facilitating the discussions.

A household survey with both structured/semi structured questions was administered to 123 respondents to capture smallholders' explanations on impact of climate change on their livelihoods and their role in climate change mitigation. Key to this method were questions aimed at capturing reasons for failure by community members and smallholder farmers to adopt and sustain climate change mitigation practices as introduced to them by experts. Aware of the dry spell that hit the area and the looming hunger, the researcher structured the questions in this tool so as to avoid raising expectations for handouts and possible bias from those handling the questionnaire at the time of data collection. Questions were made brief and to the point.

Other methods used included **direct observations** in fields and households to confirm practice of certain mitigation practices as given through focus group discussions, key informant interviews and the household survey.

Data Analysis

The researcher began putting meaning to narrations, words, observations from focus group discussions, key informant interviews and observation statements by relating these to the study themes guided by the research questions as outlined in the introduction section above. The researcher focused on how individuals and groups responded to each of the questions. He then attempted to identify consistencies and differences in order to create and explore connections and relationships between core questions of the study and the responses (Ellen *et al* 2003). The researcher then identified emerging patterns and organized these into coherent categories to bring meaning to the study. Findings from such analyses are as presented in the results section.

Quantitative data from household survey was analysed using **Epi Info**. Tables, graphs, pie charts generated and presented below show frequencies from which we have extrapolated meanings to the study themes as presented in the results section below.

FINDINGS/RESULTS

CHANGING CLIMATE AND LIVELIHOODS IN BOLERO

Data from the field study confirmed that rural communities in Bolero continue being exposed to the changes in climatic variables and are aware of impacts climate change is having on their lives. The table below summarises farmers' explanations of how they have been affected by adverse effects of climate change.

Table2: Respondents responses to climate changes in Bolero

Climate parameter	Respondents responses (percentage)				
	Increased	Decreased	No change	No Idea	Total
Length of rainy season	4	91	4	1	100
Dry Spell frequency in the area	97	0	0	3	100
Temperatures (summer)	94	2	4	0	100
Rainfall Intensity	20	61	17	2	100

Source: Field Study, Bolero 2015

The table shows that more than 90 percent of the respondents reported an increase in temperature and about 97 percent reported increase in frequency of dry spells in the area over the 5 years. Similarly, more than 60 percent of the respondents believed that rainfall intensity has decreased and 91% responded that lengths of rainfall are getting shorter. Such changes in climatic parameters have some positive impacts in terms of introduction of new farm and fruit crops and crop varieties which were not grown in the area in the past. However, there are more negative impacts on local lives, particularly for the majority of the farmers who depend on rain-fed agriculture. First, the variations in precipitation and temperature have affected the crop cycle and productivity. Farmers reported that agricultural productivity has fallen though quantification of the declining agriculture productivity due to changing rainfall patterns was beyond the scope of this paper. Over 80% of respondents gave clear explanations on the causal link between the changing climate and agricultural productivity.

Trends in the area seem to show that annual rainfall amounts and duration are changing each year with 2010 having been the driest and 2015 is likely to experience a similar drought situation with only 531 mm of rain having been received as of the day of data collection for this study--26th March, 2015 according to the Metrological Officer at Bolero. According to the officer, rains which started late; 16th January, in most parts of Bolero, were off by 28th February, 2015. As of the date of the field research, the whole EPA had not received rains for over four weeks leaving crops especially maize, soya beans, tobacco wilt beyond recovery refer to FIG 1 above.

From all the focus group discussions conducted, respondents indicated that change in rainfall pattern has also led to depletion in water sources. From their explanations availability of water for drinking and irrigation has decreased over the past 5 years. Many traditional water sources like shallow wells and dug wells have dried up. One of the farmers in Bolero 1 section said:

“about 5 years ago, there were more than a dozen water sources in this section. Many of them have disappeared and others have very little water”. Village Headman Kamangilira who is also a lead farmer, told a story of decreased water for irrigation even in wetland (madimba). That even interventions initiated to store water for irrigation purposes are not yielding adequate water for sustainable irrigation purposes. He gave an example of the water harvesting tank built with support from IRLAD which had only 3m of water out the annual 15m which it is designed to hold for an irrigation group of 20 farmers in his village in Bata Section. This he said was not adequate to raise even a vegetable crop of the least growing span of 30 days.

FIG 2: Photos of water harvesting tanks in Bolero, EPA Top right: A dilapidated roof top of an IRLAD supported water tank in Bata Section, Top left: Inside the cracked leaking water tank, Bottom right: Abandoned water harvesting tanks at Bolero EPA and Bottom left: A scorched maize crop in a farmers fields 100 meters away.



Though water scarcity may also be due to increase in demand for water as a result of increased population or intense farming, most farmers from the EPA have the understand that climate change has some role to play. Surprisingly most farmers in the extension planning area seem

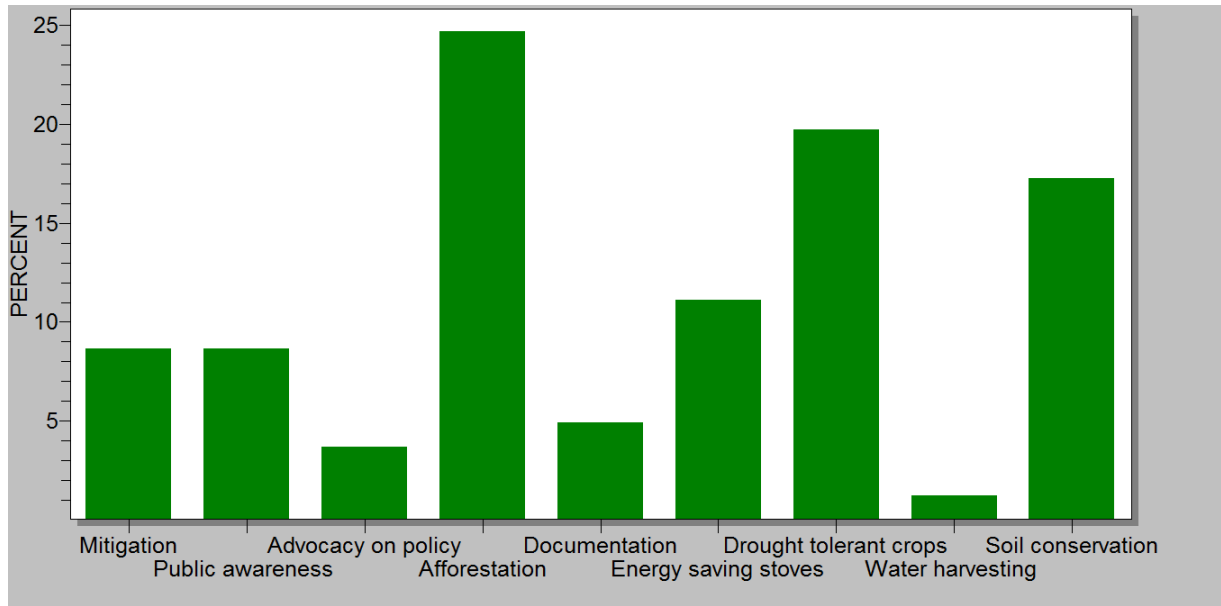
not to appreciate the need for adopting technologies that would help them conserve water to supplement rain water especially where such technologies would help them sustain crop growth during dry spells. Even where the water harvesting tanks are close by -- 100 meters in the case presented in Fig 2, farmers seem not eager to put them to use to save their wilting crops.

Because of the adverse effects that climate change has brought on livelihoods as presented in the preceding sections, smallholder farmers and community members in Bolero reported having been trained/taught climate change mitigation practices by either NGOs or government departments. They reported having implemented a number of climate change mitigation initiatives over the years with support from both external agencies and through their local institutions. While Community members and smallholder farmers showed appreciation of the climate change mitigation initiatives as introduced to them, asked how many of the practices learnt over time were currently under practice by most farming households and community members, responses were mostly cold and a flat “not many” by most of those interviewed. In the next section the researcher presents findings on Bolero communities’ climate mitigation practices and local institutions interventions in enhancing communities adoption of the practices, coordinating and sustaining communities efforts in climate change mitigation.

COMMUNITIES INTERVENTIONS IN CLIMATE CHANGE MITIGATION IN BOLERO

This study focused on interventions, technologies and practices that were introduced to communities over the past 5 years and those currently running. The researcher firstly wanted to find out how the initiatives were originated (by communities themselves and or by external agents – government or NGOs). Secondly the degree of community members involvement in planning, implementation and monitoring and lastly how local institutions facilitate the adoption of climate change mitigation practices, coordinate and sustain communities efforts in climate change mitigation especially after projects phase out. The chart below gives a summary of some climate change mitigation initiatives, practices introduced to Bolero over the past five years.

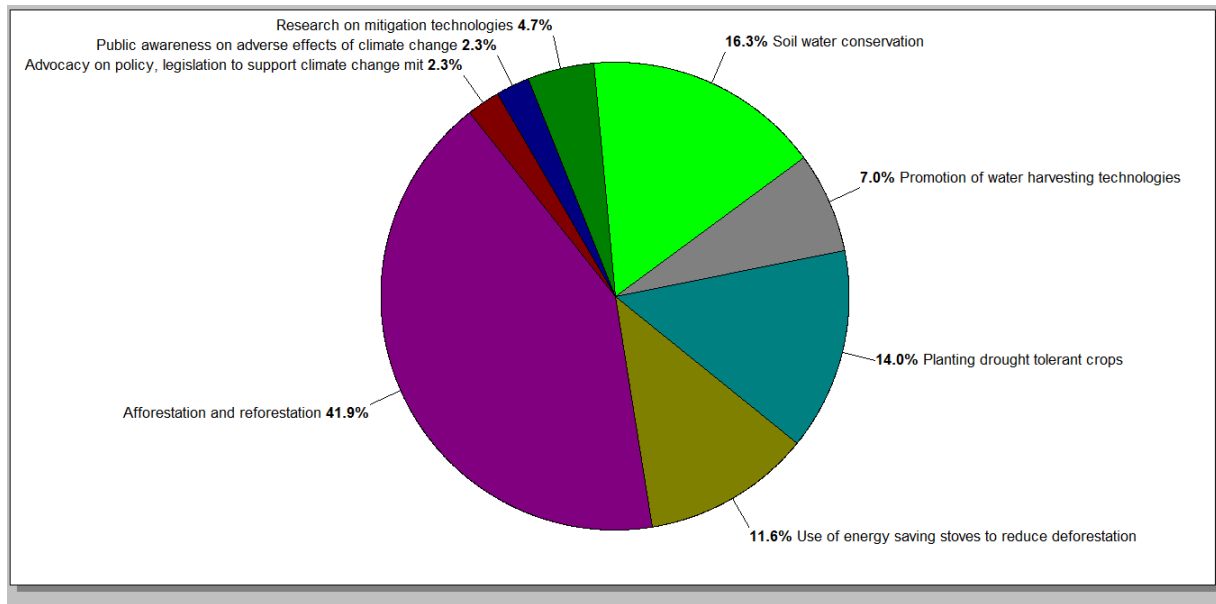
Fig 3: Climate change mitigation initiatives and practices in Bolero



As shown in the graph, there are three broad climate change mitigation and adaptation initiatives in the area with afforestation being core at 24%. Practices supporting this broad area of intervention are reducing deforestation through use of energy saving stoves at 11.6%. Interventions in the agriculture sector such as soil and water conservation, use of drought tolerant crops and promotion of water harvesting technologies on the other hand are meant to sustain agriculture productivity in the face of declining productivity due to climate change effects.

Findings as presented in the bar chart above show that a variety of climate change mitigation initiatives, practices have been introduced to Bolero. All community members of good age that the researchers interacted with reported having in one way or the other participated in climate change mitigation interventions in their community and yet they still remain vulnerable to adverse effects of climate change and are perpetually food insecure and most of them malnourished. There was little evidence from the farmers responses on how climate change mitigation practices are sustained by communities much as most respondents appreciated and some testified that if well put to use the practices would effectively mitigate the adverse effects of climate change, improve agriculture productivity and therefore end hunger in Bolero. The chart below confirms the the scale of interventions and practices in climate change mitigation in the area.

Figure 5: The scale of climate change mitigation interventions and practices in Bolero

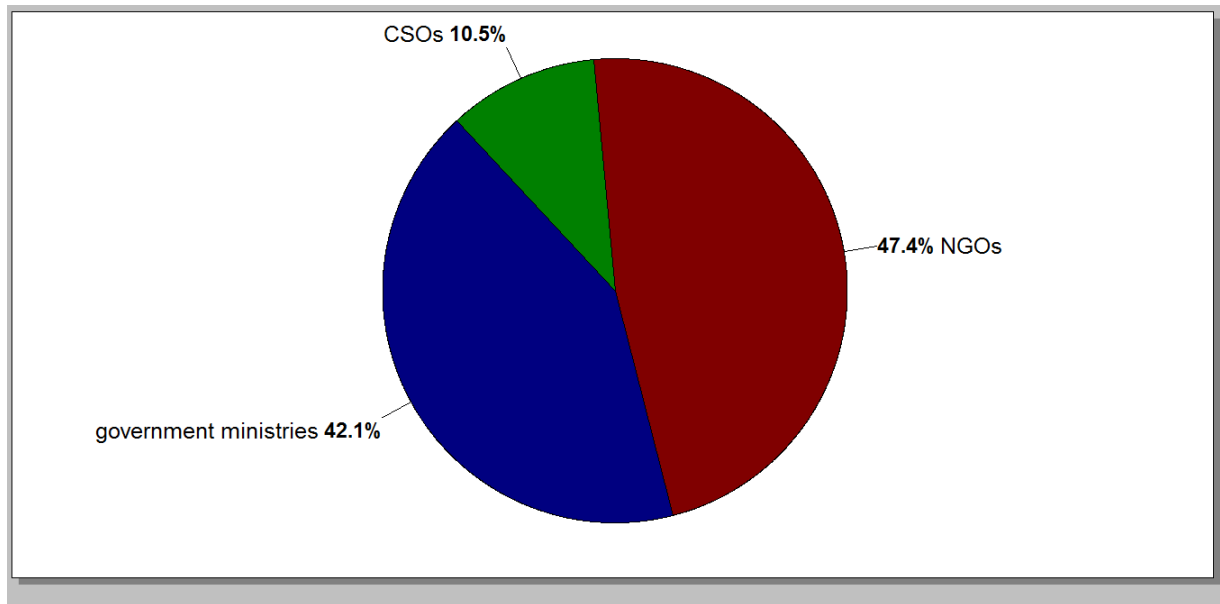


Other initiatives and practices coming out from the study and sketched in the graph above include public awareness on climate change, advocacy, policy and legislation and research on climate change mitigation and adaptation by academic institutions such as Mzuzu University and Lilongwe University of Agriculture and Natural Resources (LUANAR). All these activities are directly or indirectly supporting the Bolero community to reduce vulnerability and enable them become more resilient to shocks that come with adverse effects of climate change. Despite all these efforts, the Bolero situation as presented through findings of this study remains that of a community still trapped in a cycle of vulnerability, hunger stricken and in dire poverty. A number of organisations were reported as facilitating communities' climate change mitigation efforts in Bolero. In the succeeding section the researcher discusses these players and their interventions in helping communities cope with climate change effects.

INSTITUTIONS FACILITATING COMMUNITIES ADOPTION AND COORDINATION OF CLIMATE CHANGE INITIATIVES IN BOLERO

Over 30 organisations were reported as working with communities in Bolero in the fields of natural resources management, disaster management, community development, income generation, agriculture production among others. The following categories of players were highlighted as playing key roles in helping communities and farmers in climate change mitigation/adaptation in the area.

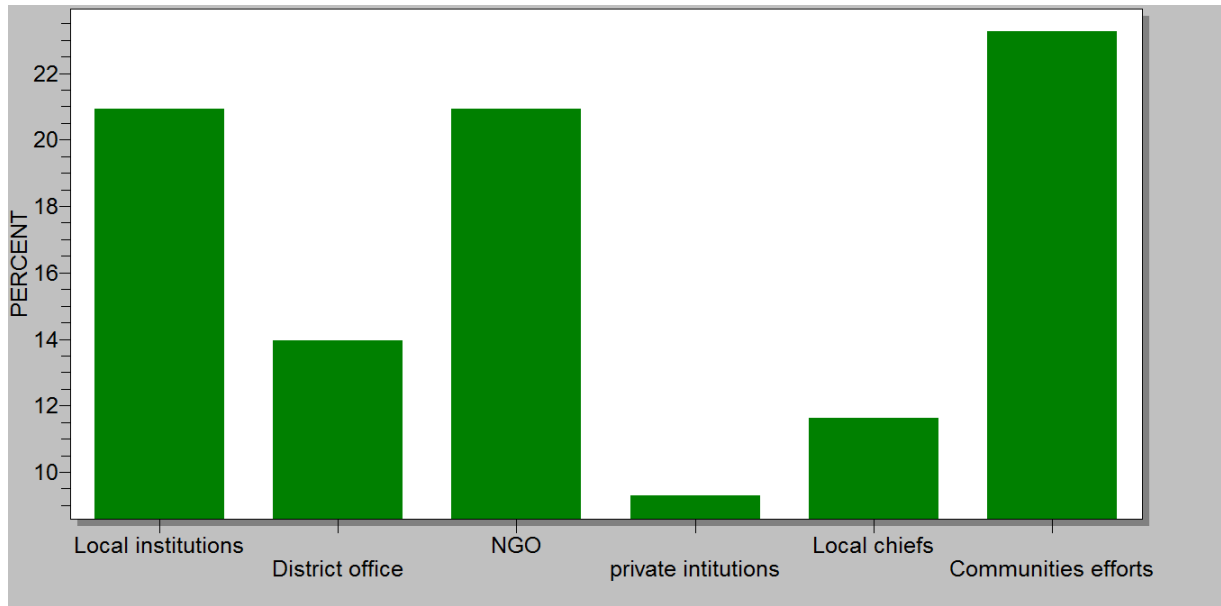
Figure 6: Major categories of available institutions that facilitate in climatic change mitigation efforts in Bolero



From the chart the major players in climate change mitigation and adaptation in Bolero are the NGOs (47.4%) while government departments including the ministry of agriculture are the second (42.1%) and the rest of civil society organisation especially in advocacy, policy and legislation are in least category (10.5%). In the above chart, we have considered those institutions whose interventions are closely related to climate change mitigation and adaptation.

An interesting finding of the study worth documenting at this stage is the declaration by both government and NGOs that they work through local institutions or community groups in delivering community development generally and in facilitating communities' adoption of climate change mitigation practices. Interviews with selected project managers of organisations working in the area showed that all (100%) declared that they implement their projects using local government structures such as the Village Development Committee (VDC), Village Civil protection Committees (VCPC), Village Natural Resources Management Committee (VNRMCs), or those specially formed and trained by the respective projects such as Project Implementation Committees (PICs) and groups of volunteers. The table below provides an overview of the institutions management/facilitation of communities' efforts in climate change mitigation as captured from the field study.

Fig 7: Local institutions/community groups facilitating communities' adoption of climate change mitigation practice in Bolero



Over 20% of climate change mitigation activities are facilitated through local institutions. Because the majority of the community members depend on agriculture, a number of other community groups, local institutions have been organized to introduce new technologies in agriculture and livestock and to manage irrigation so as to mitigate effects of climate change in the area. Such local groups as radio listening clubs, cooperatives like the Bata Farmers Cooperative Society, Project Committees of varied categories depending on areas of project thematic areas, livestock committees to mention a few were captured in this area. These are collaborating with supporting agencies to facilitate communities adoption of improved technologies like use improved varieties of seasonal and off-season vegetables and crop varieties, improved livestock breeds and such practices as conservation agriculture, water harvesting and irrigation, soil and water conservation among others.

Diverse as communities activities in climate change mitigation are in Bolero, a number of issues remain that border on coordination and sustainability of such diverse activities on the one hand and how these are integrated into a climate change adaptation plan at community and village levels on the other. In the following sections, the researcher discusses how climate change innovations and practices are or fail to be adopted, coordinated and sustained in the area. The researcher also attempted to explore communities' responses to reasons for climate change efforts not being sustained in the area over time. To do this, the researcher began by asking community members through focus group discussions how the initiatives were originated; by communities themselves and or by external agents – government or NGOs. For those activities started by external agents, the researcher wanted to know how communities owned, participated and sustained such initiatives after projects phase out. The study also wanted to

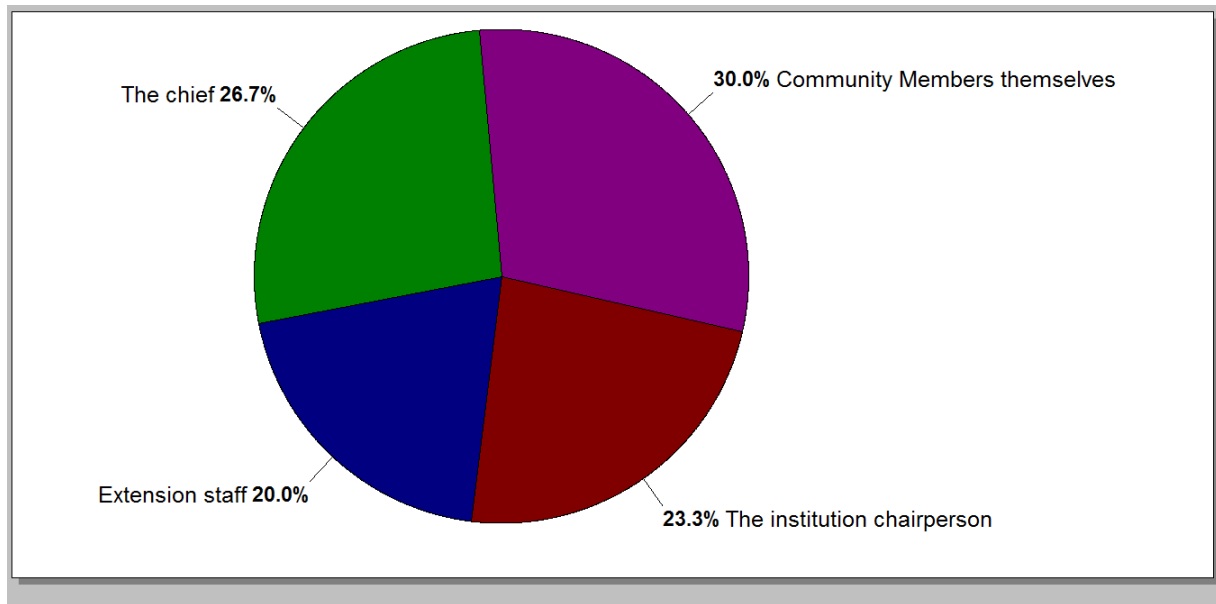
find out external agents engagement with local structures in facilitating communities adoption of and coordinating communities efforts in climate change mitigation.

As highlighted in preceding sections, there are more than thirty external agencies (both government and non-government) working in Bolero facilitating communities' adoption of climate change and coordinating all efforts in climate change mitigation. Over 18 projects currently running in the EPA have a component or more on climate change mitigation/adaptation. Such government departments as agriculture, forestry, community development and social welfare, water and learning institutions such as Mzuzu University LUANAR have programs on climate change or components thereof. The District Forest, Office for example, supports the community forest groups in forest management, use of energy saving stoves and capacity development; The District Agriculture Development Office (DADO) supports farmers by transferring improved technology like improved seed, drought tolerant crop varieties and improved animal breeds. Apart from the line extension channels, some government initiatives are implemented through the Village Development Committees (VDC). Thus the VDC is considered as an arrangement of 'bottom-up' or transformative planning process of local government. It is intended to bring voice of village dwellers and community members in project planning and implementation.

Similarly, a number of NGOs facilitate communities adoption of climate change innovations and practices in the area. Such organisations as Total Land Care (TLC) facilitate community groups adoption of innovations and practices in natural resource management. Confederation of Women Farmers (COWFA) is working with women groups sensitizing and empowering them to participate in climate change mitigation initiatives to mention but a few.

When asked on how climate change projects are coordinated in the area however, mixed responses emerged. The chart below gives a summary of the responses.

Fig 8: How climate change projects are coordinated in Bolero



Over 30% of respondents said by community members themselves, 26% reported by chiefs and 20% said by extension staff perhaps from government and NGOs. Only 23% said the institution chairperson. Responses from focus group discussions show that community members view climate change adaptation and mitigation initiatives started by external agencies as “their projects” started by them and ending with them. Extreme responses indicate serious resentments from some members where they begin to think that NGOs use them to get away with donor money in the name of community development projects. This, as shown in the summary below is one of the major reasons why communities and farmers fail to adopt and sustain initiatives in community development largely and in climate change mitigation specifically. In addition, much as these organisations work with local institutions, they do not endeavor to link these to the relevant local government departments so for coordination and continuity of activities after projects. Thus, much as the NGOs tout themselves as complementing government efforts in development and in this specific case climate change mitigation, both local institution leaders and officials from government departments lamented that they (NGOs) remain quite divorced from and work parallel to the government machinery. Where NGOs have attempted to work with local extension agents within the government structures the results have been equally negative as more often the extension agents get overwhelmed with many NGOs piling up work on them thereby exerting pressure on the already few extension workers available. Worse according the Director of Planning and Development (DPD) Rumphu is where the NGOs themselves get caught up in conflicting policies such as giving extension workers a stipend while others are against the idea- for example. This according to him bring about confusion within a system which otherwise would be leading as example in terms of extension service delivery.

It can thus be said that much as NGOs parade that they work with local institutions and agents to foster climate change mitigation practices among local communities, unlike in the case study of the Nam Think Forest Protection Team of Central Vietnam presented in the literature review section, structures created and empowered by NGOs and arrangements as are currently are not well harmonized and linked with local government departments to effectively implement government policies and district plans on climate change mitigation.

In the subsequent section the paper presents other reasons given for non adoption of climate change mitigation practices in Bolero and failure by institutions to coordinate climate change efforts in the area.

REASON FOR NON ADOPTION OF CLIMATE CHANGE PRACTICES IN BOLERO

The table below summarises reasons given by farmers and communities for their failure to adopt and sustain climate change mitigation innovations and practices over the years.

Table 3: Explanations for non adoption and non sustainability of climate change initiatives as summarised from FDGs in three sections in Bolero EPA

SECTION	REASOS FOR COMMUNITIES FAILURE TO ADOPT AND SUSTAIN CLIMATE CHANGE INITIATIVES IN BOLERO
BATA	<ul style="list-style-type: none"> • No community role models in piloting the innovations so that other farmers and community members can copy and scale up the innovations. • Extension agents have lost the steam/commitment to support community efforts in farming and climate change mitigation. They are not as motivated to facilitate community development efforts let alone in climate change mitigation. • Nobody follows up what happens in the community after projects phase out, not even district authorities
BOLERO A	<ul style="list-style-type: none"> • Some technologies are difficult, so labour demanding that they cannot be replicated on wider scale e.g. pits planting, mulching, manure use to cover fields beyond 1 acre. • Competing and conflicting messages by facilitating agents (NGOs and Government) end up confusing recipients of technologies (examples given included zero tillage Vs tillage and ridging for soil aeration, use of local varieties vs hybrids and Genetically Modified (GMOs).

	<ul style="list-style-type: none"> • Mere negligence by farmers and community members • Inadequate extension support to communities – this is due to the short term nature of most projects that usually address the needs of NGOs and not farmers • The focus by most NGOs and communities is on immediate benefits money/allowances and hand outs • There are no follow ups by authorities including local institutions and local government structures on activities of NGOs especially after projects phase out • Most project are so short term that they cannot bring about long term changes • There are no proper handovers between community groups, the district offices and NGOs when the projects are phasing out –that communities cannot even trace where to get support after projects phase out • Limited flow of information between structures and no feedback mechanisms especially on issues raised by communities—that reporting is tuned to meet donor needs and does not regard important issues as raised by communities
<p>BOLERO B</p>	<ul style="list-style-type: none"> • Some technologies are in conflict with peoples culture e.g. energy saving stoves which are said to remove the social cohesion that come with open fire... open fires are avenues of story-telling and communication hubs for family members. Saving stoves do not give family member this space • Open fires are a source of warming in the household especially in households that cannot afford blankets to the keep each member warm • Because of the nature of families -- extended families cooking pots are large and the hole of the saving stove does not give that space to heat the pots thereby delaying cooking • Some technologies are so labour and time consuming that they end up being abandoned e,g pit planting, manure making among others. • Some technologies bring about other burdens to communities e.g.

	<p>hybrids are costly in storage making farmers abandon them for local varieties</p> <ul style="list-style-type: none"> • Culture, people do not want to abandon what their parents were doing especially among the aged generation. • No follow up by implementing NGOs on scaling up of innovations hence most of them remain at demonstration • Extension has become business for the agents so they do not care about whether what they initiate and implement with communities is helping communities and being sustained in the long run • Some NGOs have polluted communities with a handout syndrome. They bring to communities allowances, refreshments and when these are gone with the project, communities also go back and seat down. • Conflicting messages among NGOs and government that end up confusing farmers e.g. ridging Vs zero tillage Vs Pit planting etc. No coordination of extension approaches and strategies.
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Responses presented in the above show a mixed bag of issues that hinder smallholder farmers and communities from adopting and sustaining climate change initiatives in the area. The issues can be put into broad categories as follows:

Community/farmer based limitations to adoption- these include all cultural barriers to adoption and those attitudes rooted in peoples’ minds that make them resist change. Such responses as negligence by farmers and community members; people do not want to abandon what their parents were doing mostly common among the aged generation;; Open fires are a source of warming in the household especially in households that cannot afford blankets to the keep each member warm, explain peoples deep seated attitudes that makes them hesitate to embrace change in this case adopt climate change mitigation practices. The study finds these as the biggest block not only to communities adoption of climate change mitigation practice but also to the transformation agenda in community development which is at the core of this study. Contrary to the belief that community development is a bottom-up movement that allows community members and everyday citizens to influence their community and their futures, these attitudes as above choke the transformative thinking and render all to be at the mercy of the central authority and therefore delay community development and in the case of this study, their ability to mitigate adverse effects of climate change and improve their livelihoods.

The second category of responses is what the researcher has termed **agent induced limitations to adoption**. These will include all those responses that border on failures, inadequacies in the agent or facilitating institutions to effectively drive the required change and trigger demand or the need for adoption and/or possible scaling up. Such responses as; Conflicting messages among NGOs and government that end up confusing farmers e.g. ridging Vs zero tillage Vs Pit planting etc; No coordination of extension approaches and strategies, some NGOs have polluted communities with a handout syndrome, they bring to communities allowances, refreshments and when these are gone with the project, communities also go back to sit down, no follow up by implementing NGOs on scaling up of innovations hence most of them remain at demonstration, most project are so short term that they cannot bring about long term changes, the focus by most NGOs and communities is on immediate benefits money/allowances and hand outs are among those that are indicative of inefficiencies among change agents to drive the transformation as required.

The third category is of those responses that are indicative of **failed technologies and innovations**. These include such responses as; Some technologies are difficult, so labour demanding that cannot be replicated on wider scale e.g. pit planting, mulching, manure to cover fields beyond 1 acre. Some technologies bring about other burdens to communities e.g. hybrids are costly in storage making farmers abandon them for local varieties are indicative of technologies that will hardly see the light of the day by nature of their design. These will remain at demonstration and therefore cannot bring about changes to wider communities as claimed in their design.

The last category is to do with **inadequate capacities of local institutions** to facilitate adoption, coordinate and sustain communities' efforts in climate change mitigation which has been another major focus area in this study. This category is demonstrated by such field study responses as; limited flow of information between structures and no feedback mechanisms especially on issues raised by communities, that reporting is tuned to meet donor needs and does not regard important issues as raised by communities, there are no follow ups by authorities including local institutions and local government structures on activities of NGOs among others. These responses are indicative of lack of proper coordination mechanism among players in the field. Of greater concern in this category is the inability by facilitating NGOs to ably link farmers, local institutions to mother/parent structures at district level for continued technical backstopping and monitoring of climate change mitigation initiatives as started by NGOs. Unlike in the transformation story of Nam Think Forest Team of Central Vietnam in the literature review section above findings in this study seem to suggest that there is in most cases no proper coordination and let alone proper handovers as NGOs exit targeted areas at the end of their project lifespan. And unlike in the case studies we presented for successful institutional arrangements that have brought about transformation and improved livelihoods elsewhere on the continent, the case presented here shows such arrangements lacking or are inadequate in Bolero resulting into disjointed and conflicting action that end up frustrating farmers and communities adoption of climate change mitigation practices and naturally they resort to settling for their old ways of doing things/farming.

CONCLUSION

In this study the researcher set out to understand reasons for communities and smallholder farmers' failure to uptake and sustain innovations, strategies and practices in climate change mitigation in Bolero. The study also sought to understand how local institutions help in facilitating communities and farmers adoption of climate change mitigation practices, coordinate and sustain communities and farmers efforts in climate change mitigation. Also key to the study was to understand the role of local institutions in facilitating how they link project supported community initiatives with relevant local government structures to ensure sustainability as projects after projects phase out..

Data collected from the field study indicate that a number of climate change innovations, strategies and practices have been introduced to Bolero by both government departments and NGOs. A number of initiatives were recorded as having been implemented over the years with some having phased out over the recent past.

Findings of this study show that despite the many climate change mitigation initiatives in the area, transformation in this area has remained elusive. Communities and farmers adoption of climate change strategies and practices has been dismal for numerous reasons which have been categorized, for convenience of the presentation herein, into four broad categories as follows: **community/farmers based limitations**- these include all cultural barriers to adoption and those attitudes rooted in people that make them resist change and therefore choking communities of their ability to transform in this case become resilient to effects of climate change and improve livelihoods. **Agent induced limitations to adoption**- these include all those inadequacies in the agent or facilitating institution to effectively drive the required transformation and trigger demand or the need for adoption and possible scaling up of innovation and/or practice. The third category is of failed **technologies and innovations** that are hard to adopt and scale up for wider utilisation and the last category is where the paper has presented **inadequate capacity of local institutions** in facilitating communities and farmers adoption of climate change mitigation practice and coordinate and sustain efforts to that end. Arguably, data collected during this study suggest that local institutions fail in their responsibility to effectively link community efforts initiated by NGOs with relevant local government structures for their continuity.

Therefore while appreciating the level of community and farmers awareness of climate change mitigation strategies and practice as introduced to Bolero by both government and NGOs, the study notes that adoption and sustainability of such strategies and practice by communities and farmers has remained dismal. That investments in climate change mitigation projects implemented in the area over time have dismally brought about the much sought for transformation and community resilience to climate change expected. Thus, communities have remained food insecure, poor and widely malnourished despite the many multi dollar efforts in climate change mitigation agriculture and community development generally.

The study also notes that local institutions instituted to accelerate communities adoption of climate change practice, coordinate and sustain community climate change mitigation efforts have remained largely ineffective in fulfillment of their role as demonstrated by their failure to engage with local communities and effectively linking them to local government structures for continuity of climate change efforts after projects phase out.

RECOMMENDATIONS

Communities and farmers adoption of climate change mitigation practices require coordinated efforts by facilitating agencies and local institutions. This calls for the need for agencies working in Bolero to form coordination platforms and coordination points for climate change mitigation at both local and district level both of which are currently lacking.

Much as local institutions are characterized by a whole range of challenges/constraints that stand in the way of their smooth facilitation of communities adoption of climate change practice as is the case currently, these if well oriented and supported they would exploit the robust institutional and resource base to become the institutional locus for climate change mitigation planning and implementation and more importantly in the adoption and sustenance of practices at farmers/community level. It is therefore important to consider more investments in building capacity of such structures in Bolero in order to drive a locally bred climate change mitigation process and a transformation agenda where the local person is at the heart of all efforts.

Literature around the roles of local institutions in climate change mitigation in Malawi shows that the current arrangements and policy frameworks gives limited attention to building on vast experience and institutional base existing in local institutions and community groups for effective local adaptation planning. This was also evident from the field research, that is, that external development agencies are far from harnessing the potential of local institutions in climate change mitigation and community development generally. But as seen in this study and as suggested by literature generally, harness the role of local institutions in climate change mitigation can offer not only lessons for community-led mitigation planning but that they would be key in driving the much needed but delayed community transformation that is prerequisite to adoption and sustainable climate change adaptation and mitigation. Facilitating institutions (NGOs and Government) in Bolero and elsewhere in the country should thus pay much attention to the fact that local institutions DACs, ADCs, VCPCs, ADCPCs, VNRCs PICs remain key in driving true community driven transformation agenda. As argued in some literature on decentralisation and local governance, local government has a privileged position to build viable linkages of local institutions and its relevant structures. (Agrawal and Perrin 2009; UNCDF et al. 2010). For this reason, this study advances for a functional and competent

local government to ensure an efficient community-bred and community-driven climate change mitigation process. With now the democratic local government with elected representatives in place an opportunity has prevailed that would foster the legitimacy for decision making and development planning with a focus on climate change mitigation at local or community level.

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