

An Investigation into the Household Climate Change Adaptation Strategies in Makonde Communal Lands of Zimbabwe

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ABSTRACT This study investigated household climate change adaptation strategies being adopted by the Makonde Communal farmers in Zimbabwe. In terms of methodology, a pluralist approach was employed to derive knowledge about the multi-dimensional context of the issue of peasant community responses to climate change. Findings suggested that the livelihoods of the local population heavily depend on natural resources and rain-fed agriculture. The community under study show low adaptive capacity, hence high levels of vulnerability to climate change. The study concluded that low adaptive capacity among community members has triggered an increasing prevalence of crop and livestock failures, food insecurity, malnutrition, disease and poverty. Whereas adaptation appears to be feasible in the Makonde Communal Lands, the local households are still merely struggling to cope with the changing environment. A more concerted effort by governmental and non-governmental institutions is recommended to engage a multi-stakeholder approach towards sustainable national and local community climate change response strategies.

INTRODUCTION

Based on scientific evidence and modeling, several studies suggest point to the fact that human-induced climatic and related environmental changes are projected to continue for centuries due to the time scales associated with climate dynamics, even if GHG concentrations were to be stabilized (Mirza 2003; IPCC 2007a, 2012). The projected climate change trends, therefore, call for innovative livelihood options and strategies to cope with and adapt to the changing environment (Carney 1998; Sherbinin 2006).

Whilst some communities of the world may be enjoying some positive impacts of climate or taking advantage of the changes, many more are suffering from the negative impacts and facing increased vulnerability, especially in economically challenged regions such as sub-Saharan Africa. Gbetibouo and Ringler (2011), Antwi-Agyei et al. (2013) and Biersbroek et al. (2013) concur the to the observation that whilst climate change adaptation has since assumed

prominence in international discourse, there remains a lack of understanding of the key factors that constrain the effective attainment of adaptation strategies by households across sub-Saharan Africa. It is the observed high vulnerability to climate change of the technically disadvantaged rural communities that has guided the focus of this study. This study seeks to investigate household climate change coping and/ or adaptation strategies in the Makonde Communal Lands of Zimbabwe.

With reference to the high vulnerability status of sub-Saharan Africa to climate change, Anselm and Taofeeq (2010) observed that whilst farmers in some regions may benefit from longer growing seasons and higher yields, the most common effects for tropical Africa are expected to be adverse (Sango and Nhamo 2015). Tropical Africa's agricultural system in practice is basically a function of the two climatic variables of temperature and rainfall. The two variables are evidently recording significant changes that are posing new challenges for various crops, regions and farming systems (Ziervogel et al. 2010). Based on the already known sub-regional climate change trends and the associated level of vulnerability of its population, it is the aim of this study to zero-in on a micro-scale perspective of community responses to climate change using the Makonde Communal lands as a case study

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(Sango and Nhamo 2015). The key concern of this study is that in the face of growing evidence of climate change and its potential negative impacts, there is still lack of understanding of climate change-related hazards, natural resilience and required community resilience in order to successfully manage the vulnerability at local level.

Similar to the study carried out by Sango and Nhamo (2015), this study is intended to explore the nature and degree of severity of impacts the global climatic change on poor and vulnerable rural communities of Zimbabwe and the developing world at large. In terms of knowledge gap, studies on the consequences of climate change at local community level particularly in Africa are still scarce. The long history of limited research capacity on climate change impacts in the South is ironical in the sense that the tropical South is considered the most vulnerable to climate change. Whilst barriers to climate change adaptation among low income rural communities are generally known, there is need for more comprehensive and evidence-based understanding of the vulnerability of agriculture-dependent rural livelihoods to climate variability and change. An in-depth understanding of climate change-induced livelihood vulnerability requires an exploration of the factors that constrain the operationalisation of adaptation strategies and it is this aspect that the study seeks to address.

The paper is structured as follows: Part one presents an introduction to the paper, which provides a summary of the background to the study, its purpose and rationale for the study; part two presents the context of the study. The third part presents a theoretical review on rural community responses to climate change and options for sustainable adaptation. The fourth part provides the methodological approach and instruments used in the study followed by part five, which presents the results and discussion of findings. The paper ends with a conclusion and a summary of suggestions.

Objectives of the Study

The objective of this study is to investigate household climate change adaptation strategies in the MCLs of Zimbabwe. In this regard, the study sought to answer the following questions:

What is the adaptive capacity of the local small-holder farmers to climate change and variability? What coping and/ or adaptations strategies are being pursued by local peasants to overcome climate change and variability challenges?

Context of the Study

Based on a significant amount of climate change evidence, Zimbabwe has since 2011, started the process of formulating a strategy for responding to the problems posed by changing climatic conditions. It has been noted that the absence of a comprehensive climate change response strategy in Zimbabwe's institutional setting has been greatly limiting the effectiveness of climate change responses at both national and local level. The growing scale and frequency of damage arising from climate change-related disasters only proves the need for a climate change response strategy in Zimbabwe. Zimbabwe's apparent struggle to effectively come up with a comprehensive climate change strategy is based on the fact that the nation has been facing national economic challenges since the mid 1990s. The sustained economic meltdown over the years has necessitated Zimbabwe to reduce the national budget allocation to public services and rural development. Given such weak economic scenario, vulnerable sections of the population, including the farmers in the Makonde Communal Lands (MCL) have been left to fend for themselves, with no option but to adopt at local level, a variety of livelihood strategies for survival.

Makonde Rural District lies in the Mashonaland West Region to the north-western part of the country. In terms of historical background, the MCL as a geographical and socio-economic unit are a product of the pre-independence-era land apportionment system which created a dual subdivision of the country into two agro-ecologically based agrarian structures. One of the categories was the commercial farming areas in the more accessible and agro-ecologically productive regions I to III, while the other consisted of communal reserves, in which the MCL lie, which is characterized by poorer soils and hot and dry low land regions IV and V of the country (Ranger 1983; Murombedzi 2003). Factors such as: the naturally stressed ecosystems, rapid native population growth pressure and the unregulated access to and use of land resource-

es has had a heavy toll on the state of the environment in Zimbabwe's communal lands such as the Makonde case study. Even during the independence Zimbabwe of today, the dual agrarian structure still prevails for instance in the form of the remote; drought prone MCL juxtaposed by the well-served agro-ecologically advantaged Makonde Commercial Farming Area. The population in the MCL is mostly constituted by semi-subsistent smallholder farmers who heavily depend on their annual produce as the source of livelihood, food and income. In terms of scope, therefore, the study will be confined to the MCL of Zimbabwe. The communal lands cover a narrow belt along the southern end of the Makonde District, sharing its northern border with the Makonde Commercial Farming Area.

Theoretical Review

Community Responses to Climate Change: A General View

With regards to the future outlook of climate change and its potential impacts, as noted earlier, there is going to be continued climate warming irrespective of ongoing mitigation efforts (Mirza 2003; IPCC 2007a; Kusangaya et al. 2014; Wright et al. 2014). The most feasible option therefore to sustain livelihoods and wellbeing among the vulnerable communities of the South is to devise innovative climate change adaptation strategies (Sherbinin 2006; Mabe et al. 2012).

The IPCC defines adaptation as "adjustment in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts" (IPCC 2007b). Carney (1998) and Smit et al. (2001) concur that adaptation to climate change is the process through which people reduce the adverse effects of climate on their health and well-being and take advantage of the opportunities that their climatic environment provides. It is important to note that successful adaptation to a changing environment is a function of the means available to the affected community and this is to do with adaptive capacity (Pittock and Jones 2000; Kpanodou et al. 2012; Holler 2014). According to the IPCC, adaptive capacity is defined as the "ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences"

(IPCC 2012; De Souza et al. 2014). Indicators considered determining both vulnerability and adaptive capacity include factors such as: income; infrastructure; education; and state of civil society; community organizations; institutional and decision-making frameworks; and existing early warning systems among others (Sissoko et al. 2011; Kpanodou et al. 2012). From the perspective of the development discourse, the IPCC notes that adaptive capacity to deal with climate risks is closely related to sustainable development and equity (Smit and Pilifosova 2001).

With regards to the definitional conflicts of the concept of adaptation, Schipper (2004) suggested that in some instances, coping and adapting may be used synonymously, but essentially there are distinct differences between these terms (Rennie and Singh 1996; Davies 2011). Coping measures are generally considered to be short-term to ward off immediate danger, rather than to adjust to continuous or permanent threats or changes (Fankhauser 1998; Holler 2014). The IPCC suggests a "coping range", whereby there are limits to coping, which imply that in going beyond these, a system will break down. In the context of climate change, coping is, therefore, not a sustainable solution that allows for adjustment, but rather a temporary response (Smit et al. 2001). Nevertheless, coping strategies are considered to be part of the portfolio of options for responding to events and threats, particularly for poor households and communities (Burton et al. 2002; Biersbroek et al. 2013).

Constraints to Climate Change Adaptation

In sub-Saharan Africa and the vast part of Asia, agriculture and natural resources extraction constitute the basic provision of food and income. A weak diversification momentum of the rural communities' economy is a big constrain that undermine their prospects for sustainable adaptation to climate change (Kandji et al. 2006; Kusangaya et al. 2014). With regards to the wide range of barriers to climate change adaptation in sub-Saharan Africa, Antwi-Agyey (2013) and Singh et al. (2014a) suggested that in order to understanding the vulnerability of farming-dependent communities to climate variability there is need to fully explore the factors that constrain desired adaptation strategies. Besides the ad-

verse natural living environment of rural communities, the Southern regions are often characterized by weak institutional support and poor governance to enhance their prospects for effective climate change adaptation. This has seen the struggling rural communities having to continuously rely on primitive indigenous institutions and norms for guidance in their coping strategies to sustain their livelihoods (Chishakwe 2010).

In a case study on adaptation strategies for rural livelihoods in El Salvador by Schipper (2004), the findings suggested that poor communities do respond to climate variability and hazards. In order to mitigate crop and livestock failure, rural households in El Salvador strive for off - farm job opportunities within and outside their villages, or abandon cultivation altogether and seek other sources of income. For many who fail to adjust to the recurrence of climate risks in the villages, Schipper (2004) added that they migrate either temporarily or permanently to nearby urban centers where in many cases they face even worse livelihood challenges. There is an overall tendency among vulnerable households of consistent dependence on outside agents as cause for self-victimization and the analysis suggest that the role of non-governmental organizations (NGOs) is among the factors that present challenges to sustainable adaptation process to climate variability and change in El Salvador.

Institutional Responses to Climate Change Risks

Ever since the emergence of climate change evidence of and its ecological and socio-economic implications, government institutions at all levels have struggled to establish effective climate change intervention mechanisms (Mustapha et al. 2012; Lubega et al. 2014; Wright et al. 2014). According to the Millennium Ecosystem Assessment (2005), the most feasible way to mitigate and adapt to climate change impacts is to seek state-guided intervention mechanisms to contain the continued degradation of ecosystem services. The MEA provides an opportunity to potentially reversing the degradation of ecosystems while meeting increasing demands for ecological goods and services at local level (Biggs et al. 2004). The overall aim of the Millennium Ecosystem Assessment (MEA)

is to contribute to improved decision-making concerning ecosystem management and human well-being, and to build capacity for scientific assessments to enhance sustainable synergies between ecosystems and human well-being (Munasinghe and Swart 2000; Nhemachena and Hassan 2011; Agbongiarhuoyi et al. 2013).

According to Moyo et al. (2012) and De Souza et al. (2014), there is a need to integrate ecosystem management goals with other sectors within broader development planning frameworks to strengthen prospects for a climate resilient economy. This needs support in the form of integration among multilateral environmental agreements and other economic and social institutions. Sector specific responses include attention to the agricultural, the water sector and forest sector among others. There is need also to consider the holistic nature of people's lives that is based on their use of multiple livelihood strategies. This calls for institutional and technical responses which are cross cutting between sectoral boundaries since these sectors constitute interrelated units within an environmental system (Munasinghe and Swart 2000; Singh et al. 2014a). Other responses include social behavioral responses based on improved population policy, public education, active civil society, and empowered local communities, women, and youth and such initiatives can be very effective in responding to the problem of climate change-induced ecosystem degradation (Gbetibouo and Ringler 2011; D'haen et al. 2014).

Technological response is also necessary given the growing population pressure on ecosystem productivity and associated services particularly in the face of adverse effects of climate change stressors. The development and diffusion of technologies designed to increase the efficiency of resource use or reduce the impacts of drivers such as climate change and nutrient loading are essential (Chagutah 2010; Ayers 2011). This should include; promotion of technologies that result in increased crop yields, and resistance to drought, heat stress, pests and disease are essential, but careful considerations have to be put in place to avoid or mitigate the negative ecological, social and other externalities of their application; restoration or rehabilitation of ecosystem services and the promotion of technologies that increase energy use efficiency and reduce GHG emissions (Desanker et al. 2001; MEA 2005; Wright et al. 2014).

Another prospect for sustainable options to cope with and adapt to climate variability and change initiatives is derived from the Sustainable Rural livelihoods Framework (SRLF) as presented by Carney (1998). The aim of the SRLF is to improve the understanding within key government and local authorities of institutional support that is required to promote sustainable livelihoods. Cameron (1999) reiterates that the framework is a people-centered approach to research and policy formulation and has since had positive influence on rural development policies in many rural communities. To enhance the effectiveness of the framework, exploring the applicability of the concept and practice of *Sustainable Intensification* is necessary. Mwitubani and van Wyke (2010) and Brown et al. (2012) maintain that sustainable intensification implies a land management approach that generates higher yields with more efficient use of inputs on a sustainable basis, while reducing environmental loss and building resilience, natural capital and sustaining the flow of ecosystem goods and services.

METHODOLOGICAL APPROACH

The objective of this study is to investigate household climate change adaptation strategies in MCL of Zimbabwe. In this regard, the study sought to answer the following questions: What is the adaptive capacity of the local smallholder farmers to climate change and variability? What coping and/ or adaptations strategies are being pursued by local peasants to overcome climate change and variability challenges? Accordingly, the selection of the design and instrumentation adopted in the case study was essentially guided by the research questions (Bryman 2012).

Whilst the study is generally dominated by the qualitative methodological perspective of inquiry, the complex nature of the subject matter under study required pluralistic approach in the field. The subject under study is complex in the sense that it covers several dimensions including; the biophysical, socio-cultural, economic and political aspects altogether constituting a rural livelihood system. A mixed research strategy was therefore employed also involving quantitative approaches in the study. A qualitative methodology of inquiry provided for the interpretation of events and phenomena such as those associated with rural livelihoods and climate change challenges and opportunities in the Makonde District of Zimbabwe (Sango and Nhamo 2015).

Within the context of this research, social phenomena such as personal experiences, beliefs, attitudes and opinions of the members of the smallholder Makonde community, local authorities and experts were investigated.

A triangulation of data collection instruments was applied in the survey including: key informant interviews; household questionnaires; document review and structured field observations. Key informant interviews are among the critical instruments employed in the case study. By means of purposive sampling, a number of government agencies were sampled based on their special responsibilities in the issues of climate change, livelihoods and natural resources management. The key informants provided vital information about the climate change patterns and their biophysical impacts and local level responses to the problem as applicable to the scope of their responsibilities. With regards the historical profiling of local climate change experiences, a total of ten elders were selected by means of snow-balling method and an unstructured interview was conducted for one elder from each of the ten villages (Marshall and Rossman 1999; Creswell 2003).

The questionnaire survey as a tool was adopted in this particular study because it is the most appropriate and cost effective method in surveying a large sample population as in this particular case where 500 households were surveyed. Given the data collection costs and other constraints, a sample of 500 households was viewed as significantly representative of the population under study. A stratified sampling framework was employed for this purpose on all the 10 listed villages in order to provide an opportunity for equitable representation of all the villages under study. The household survey sought to elicit socio-economic characteristics of households, knowledge and experience concerning coping and adaptation strategies to local climate change and variability trends (Bryman 2012; Sango and Nhamo 2015).

Field observations through transect walks were conducted in and across the ten villages in the study area to identify specific climate change and associated biophysical indicators and livelihood responses in the area. Aspects for observation in the case study included: land use, biophysical conditions, artifacts and other indicators of climate change including household-level climate change impacts and associated coping strategies.

The analysis of data in the study involved both qualitative and quantitative techniques.

With respect to qualitative data, detailed descriptions and classifications were involved to provide insights into research questions. The creation of typologies was among the ways of analyzing qualitative data, helping to make sense of large amounts of data through grouping of items that share common characteristics (Strauss and Corbin 1990; Flick 2002; Sango and Nhamo 2015). Basic geographical Information Systems (GIS) was employed as a means to integrate different components of the prevailing environmental conditions and community wellbeing. The analysis also involved an evaluation of the natural ecosystem services connected to local livelihood sectors with great emphasis on how climate change impacts on forests and other land resources and in turn how these influence the identified livelihood sectors.

RESULTS AND DISCUSSION

As has been noted in the previous sections that even if the best possible climate change mitigation measures were to be put into effect, for the foreseeable future the smallholder farmers of the Makonde Communal Lands will have no option but to at minimum, cope with or ideally, adapt to the ongoing change in climate. Given the largely subsistent status of their farming system, economies, and the marginal prospects

of external support, the issue of adaptation to climate change remains a major challenge for the local community. What has been noted in the survey is mostly coping strategies to climate change rather than adaptation per se.

The findings of the case study suggested that the farmers in the Makonde communal lands (MCL) together with the external support system currently in place lack sound adaptive capacity. Nevertheless the community is responding in the best way they can to the climate change impacts and it is this that is referred to as coping strategies, both internal and external. In response to the occurrence of crop failure, the households have got a number of options to cope with the situation (Fig. 1). In the face of crop failure, the most popular coping option was engaging in 'food for work' projects run by either government or non-governmental organizations accounting for 18.9 percent popularity among households.

The next popular option to crop failure among the households was barter trade with livestock and other valuables that households possess or produce in craft-work. The other options include buying from local and external markets (10.8 percent), borrowing and food handouts. It was important to note that 51.8 percent of the households actually employ all the options to their disposition. The Elders' interview suggest-

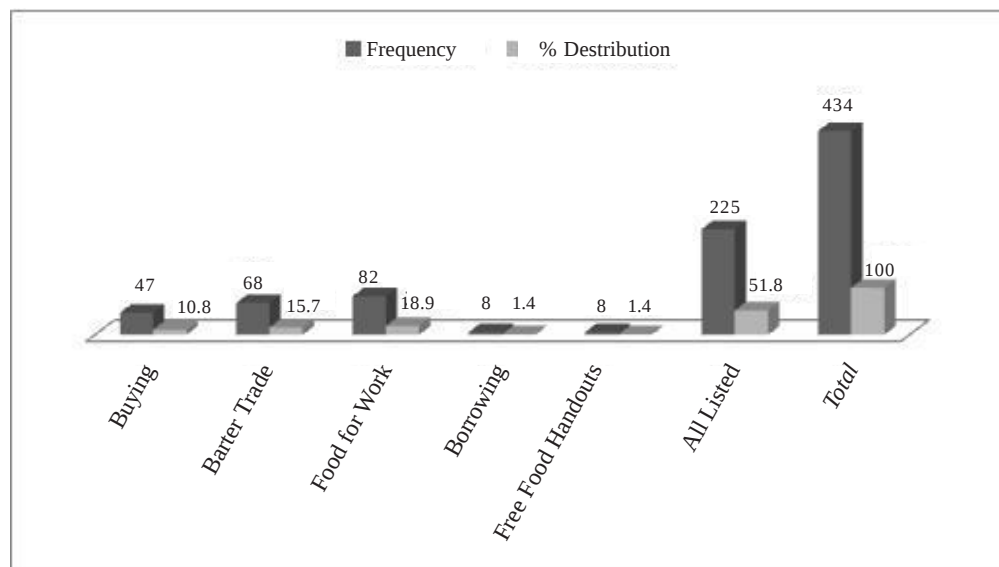


Fig. 1. Household coping strategies to food crop failure (n=434)

ed that one other common strategy is: reducing the number of meals taken especially for adults, reducing meal portions, and giving more food to children at the expense of adult consumption. Due to increasing crop failure incidents coupled with input capacity, households are progressively planting less and less hectares of food crops and shifting towards the growing of cotton.

One major concern noted by the Agricultural Research and Extension Services (AREX) Officer among this conservative community is that whilst maize is failing as a crop option in the district due to aridisation, the majority of households (80 percent) continue to plant maize as the most preferred crop variety. The small grains (such as sorghum and millet) that have proven successful in terms of drought resistance and yield remain marginally preferred by most households with only about three percent having adopted the small grains in the last few seasons. The community in the Makonde Rural District like among most Zimbabweans has maize and maize meal as its staple food. The fact that they would expect a maize crop in the field and a maize meal on their table makes shifting to drought resilient crop options such as *rapoko* or millet is culturally inconceivable. Efforts by AREX and several NGOs to disseminate and promote the growing of the more successful crop varieties in the face climate change have largely failed. According

to the local elders, *rapoko* and millet are shunned by local community members and consumers of food derived from such crops are generally looked down upon as second-class households.

The other coping strategy to crop failure and income loss among many households is to sell off their livestock to obtain money for food purchases or simply barter the livestock for grain. Besides food needs, other reasons to selling cattle include; paying education expenses, paying medical expenses, and other household costs. Forms of casual labor for income most common in the district include: brick molding, fencing, thatching, building, weeding and harvesting (most popular among women) in the neighboring irrigated commercial farms. To highlight the coping capacity of the Makonde community to food insecurity, the success levels of the households' were examined (observe Fig. 2).

The findings as illustrated in Figure 3 suggest that the community is struggling to cope with the environmental change-induced food shortages. As much as 71.5 percent of the households find their coping strategies being hardly successful, with 12.6 absolutely failing to cope with the consequent challenges. Only about 15.9 percent of the households claim to be successful in coping with food shortages.

The findings also suggest that local livelihoods dependent heavily on livestock assets

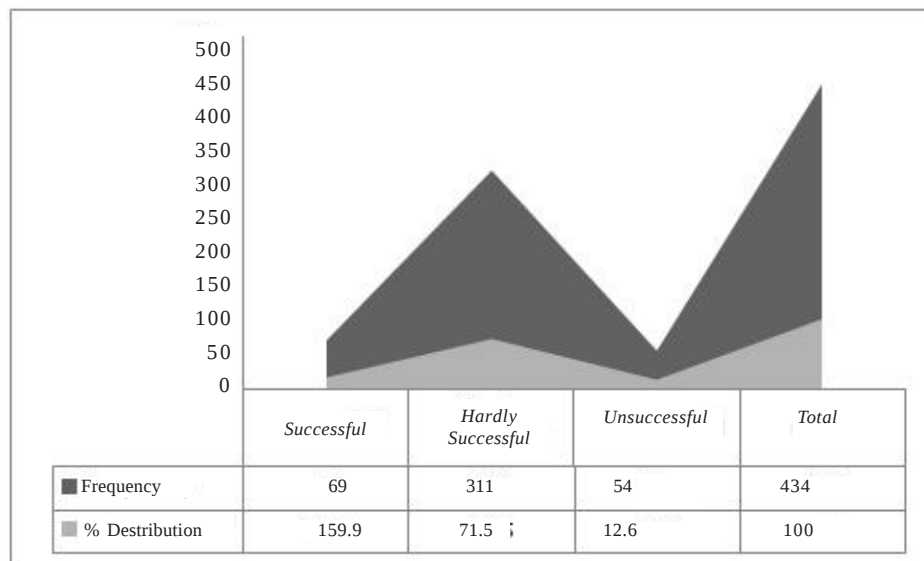


Fig. 2. Success rates for household coping strategies to food insecurity (n=434)

and crop production for both food and income. This dual role of farm output as source of food and income is deeply engrained among the Makonde peasant community. The increasing frequency and magnitude of climate change-induced crop and livestock failure in the case study area does not only undermine food security, but also household income.

Figure 3 illustrates the stressful consequences of loss of farm income as households struggle to cope with the double climate change impact of food insecurity and a lack of income.

The common options available to households to cope with loss of farm income include: sale of livestock (14.4 percent), paid labor (12.0 percent), barter trade (8.7 percent), craft work and the employment of all the coping options by the majority (60.5 percent) of the households. This shows that most households employ a multiplicity of income generating activities within their reach but what is unfortunate is that the options are hardly successful in meeting family needs.

In terms of coping capacity to loss of income opportunities 71.5 percent of the community find their coping strategies hardly successful whilst as much as 16 percent are unsuccessful in coping with the income challenges (see Fig. 4). The impacts of climate change tend to trigger coping responses that influence the environmental and socio-economic drivers of the food security supply chain in both a positive

way as well as in negative ways which essentially translate into maladaptation.

About 12.6 percent of the sampled households' coping strategies to drop in farm income are successful and this is explained by livelihood diversity among the households which keeps them food and income-secure even in times of climate-induced shocks. It is this part of the community that has potential for adaptive capacity to climate change that is mostly derived from external factors such as remittances and waged income.

It is generally assumed that women have got a greater burden of attending to various domestic chores ranging to child-care and other house-keeping. This tends to constrain them against livelihood diversification and effective adaptation strategies to climate change. An attempt was made in the analysis to determine whether there are any statistical differences between males and females in the case study in terms of success levels in coping with climate change-induced food shortages (Fig. 5). Figure 5 provides a comparative view of success levels between sexes. The assumption put forward in this analysis was; there is no statistical difference between males and females in terms of success rates in food mobilization. The observed significance level for the Pearson Chi-square is 0.797 based on the 5 percent significance level. With this, the null hypothesis is rejected. It implies that there is a statistical difference between males

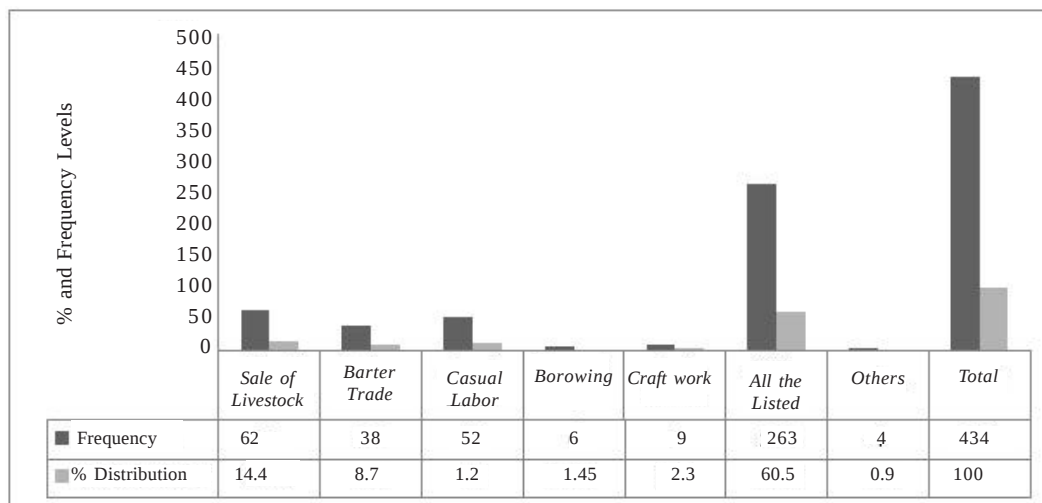


Fig. 3. Household coping strategies to loss of farm income (n=434)

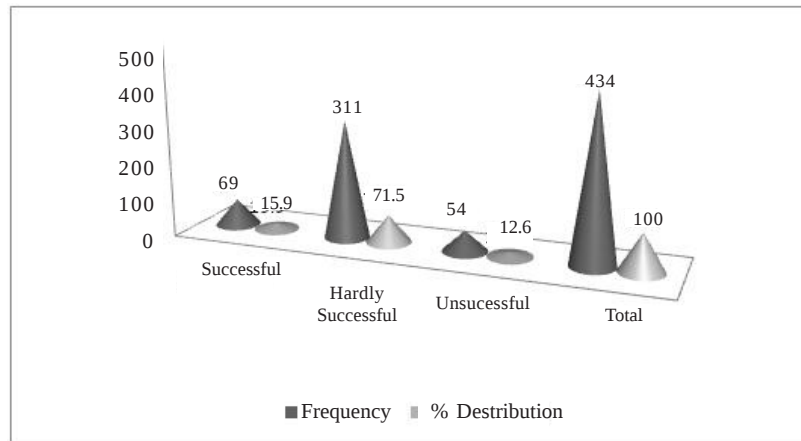


Fig. 4. Household coping capacity to loss of farm income (n=434)

and females in terms of success rates in food mobilization.

The difference is however smoked by the fact that male respondents were more in the survey, and so giving the male group greater frequency in all categories of sex rates. The commonly observed lack of adaptive capacity to the challenges induced by changing climate among the households in the Makonde communal lands is partly due to the general absence of sustained external support to complement the households' coping strategies.

The government institutions are struggling to provide any sustained climate change adaptation strategies to the communities and households. Due to the large extent of rural livelihood vulnerability in the case study area and other districts in the country, coupled with organizational and budgetary constraints, a large part of the vulnerable communities is hardly receiving any kind of relief support.

As much as 89.2 percent of the sampled households acknowledged the existence of outside assistance towards climate change adapta-

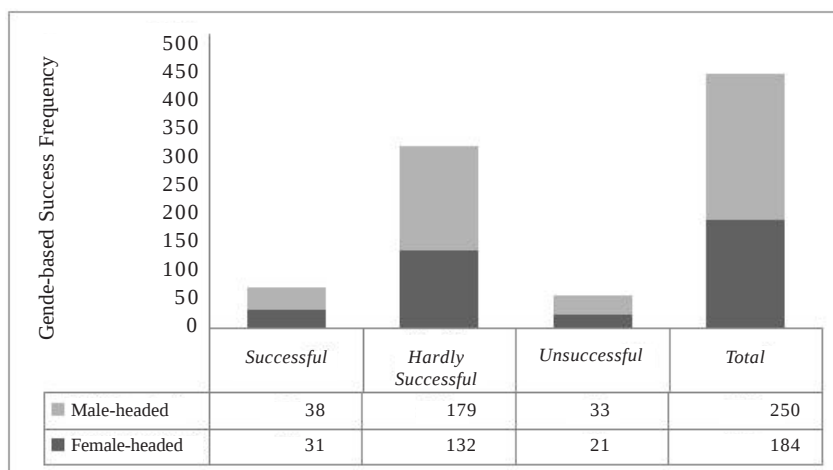


Fig. 5. Gender-based comparative view of success levels of coping strategies (n=434)

tion whilst 10.2 percent suggest a non-existence of outside assistance.

Among the key agents of outside assistance was AREX, which proved to be popular among households with 89 percent receiving assistance in the form of education and training on climate resilient farming techniques such as conservation farming. The Grain Marketing Board (GMB) is the Zimbabwe government's grain trade and marketing company. Among its central responsibilities, is to ensure the availability of adequate food grain supplies for the local demand either from internal production or from exports during all times. The GMB was popular among households with 88.7 percent acknowledging its support in supplementary food grain supplies whilst 6.7 percent suggested benefitting from farm input supplies.

A non-governmental organization called Farm Community Trust of Zimbabwe (FCTZ) was popular for providing a variety of assistance ranging from food supplies, input supplies, water supply development and education with 61.1 percent suggesting that they receive all these various forms of assistance from the organization.

A Catholic Relief agent called CARITAS provides a similar range of assistance to the local community as that of the FCTZ. An estimated 64.5% of the sampled community acknowledged receiving all the forms of assistance as provided by the FCTZ (Fig. 6). Among outside assistance

providers to the local community, the two non-governmental organizations namely FCTZ and CARITAS were found to play multiple roles in enhancing the local community's coping capacity to climate change impacts.

Other agents operational in the area include the Environmental Management Authority (EMA) focusing on the conservation of the natural environment, specifically targeting forest, soils, water, and wild life protection. Efforts are being made through EMA to contain veldt fires, deforestation, and uncontrolled gold panning in the area. Despite its visible operation in the study area, EMA's efforts towards environmental protection are facing challenges.

There are two factors that contribute to this failure. The capacity challenges on the part of EMA to police illegal activities and enforce environmental laws and the desperation of the community to survive outside the traditional farming activities by resorting to unsustainable resource extraction activities. One typical example is the widespread practice of gold panning on dry river beds, forested areas, pastures and even crop fields which has seen many parts of the communal areas being degraded into a state of disrepair. A process of maladaptation has since set in, putting the community in an even more vulnerable state to ongoing climate change impacts. In the face of failing agricultural livelihoods, a degraded natural environment, with less water and depleted biological diversity will ex-

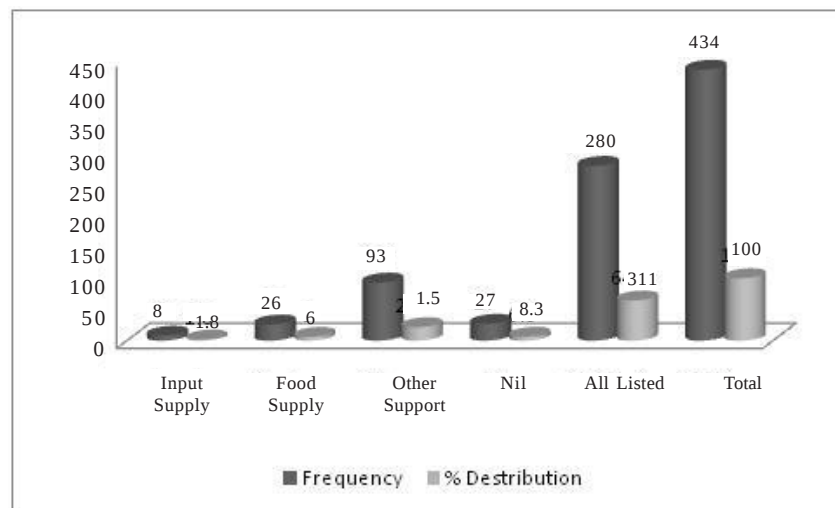


Fig. 6. Multiple roles of CAIRAS in improving local livelihoods (n=434)

acerbate household vulnerability, food insecurity and poverty.

With regards to the evaluation of the assistance offered by the different organizations, AREX has got the highest rating of good from 88.9 percent of the sampled households. This is followed by NGOS with 61.3 percent good rating from the community. On the other hand the Makonde Rural District Council has the lowest rating of weak/poor performance from 78.3 percent of the sampled households followed by the Government agents having the poor rating from 43.3 percent of the sampled households. The ratings of outside assistance by the local community reflect the precarious situation in which the Makonde Communal livelihoods occur. They are operating and surviving in a situation with the barest indicators of sustainability.

The generally unsustainable coping strategies to climate change noted in the case study bring about a host of socio-economic implications to the households and the community. The socio-economic implications take several dimensions including; food insecurity and malnutrition; lack of access to health, education and other basic services; breakdown of marriages and social structures; increasing disease burden; and the increasing prevalence of coping strategies (in poverty) that are detrimental to the long term well-being of individuals, households and communities. As the smallholder farmers in the Makonde communal lands struggle to cope with climate change impacts, they often engage in maladaptation options rather than adaptation, thus, exacerbating the poverty-environmental degradation cycle in which they are trapped.

One critical institutional aspect that is missing in enhancing community adaptive capacity to climate change is the climate change early warning and preparedness system. In Zimbabwe, it is the Department of Meteorological Services that is responsible for providing weather and climate information. In terms of technical capacity to provide sustained early warning systems for effective disaster preparedness and management, the department has been off the mark many times in the past with its weather predictions. The predictions are increasingly being questioned by farmers and disaster preparedness organizations. The Met officer conceded that climate change monitoring remains a big challenge in Zimbabwe. With this capacity gap at institutional level, it is the local rain-fed semi-subsistence farmers who are at the receiving end of climate change impacts. It has been common

to see warnings of climate hazards such as floods or drought only coming as the phenomenon is already on its way, making it extremely difficult to prevent any damage or losses to crops, livestock, life or property.

CONCLUSION

Based on empirical evidence, the smallholder farming community in MCL is experiencing significant climate change since 1962. The livelihoods of the population in the MCL are based on traditional rain-fed agriculture, complemented by the extraction of local natural forest resources for food and income. Faced with unprecedented changing climate, particularly related to the increasing incidence and severity of drought spells, the Makonde communal farmers lack the necessary knowledge, skills, and infrastructure and material resources to equip themselves with effective climate change adaptation strategies. As a consequence, the households are struggling to cope with the impacts of climate change, whose situation is exacerbated by a general lack of access to sustainable outside assistance from government and other institutions. The weak adaptive capacity, both internal and external, is exposing the community and households of the MCL to increasing vulnerability to food insecurity, poverty and other socio-economic stresses. To address the low adaptive capacity of the local peasants, there is need for greater commitment from government to lead in the climate change response strategies. Government in partnership with development partners must put in place a multi-stakeholder and multi-dimensional intervention framework to provide for sustainable climate-resilient rural development. Embracing lessons learnt from the MEA and Livelihood Assessment Framework as suggested would go a long way in enhancing the effectiveness of this climate change response initiative. Developmental efforts aimed at integrating rural ecosystems management goals within the broader national and rural development planning frameworks are viewed as an opportunity to bring into effect climate resilient rural livelihoods.

RECOMMENDATIONS

Based on the conclusion that the Makonde community is currently struggling to cope with

the impacts of the observed climate change, the paper seeks to put forward a number of recommendations towards enhanced community and household climate change adaptation. The recommendations are anticipated to address the multidimensional nature of the challenges ranging from: climate change information gaps; institutional capacity constraints; environmental vulnerability; socio-economic vulnerability and adaptive capacity constraints. Bearing in mind that the case study is not exhaustive in its breadth and depth, suggestions for further research on the climate change-rural livelihoods discourse will be put forward too.

Among the primary challenges noted in the study militating against climate-resilient agricultural production systems, food production and livelihoods was the lack of vital information on climate change and variability. The study recommends increased financial and technical input from government to provide the requisite capacity building support for institutional, technical and human resources development to make climate information more cheaply, easily and widely available. Specific areas that need capacity building include: weather focusing, climate change monitoring and early warning systems; climate change education; appropriate weather information and dissemination to the farmers. With increased access to conventional climate risk information, it is hoped that farmers can employ the rule of thumb, particularly in making decisions on: when to plant; what to plant; how much to plant; timing of weeding, fertilizer application, and other practices such as water conservation strategies based on concrete forecasted weather information.

The challenges that the Makonde communal farmers face in their effort to cope with and adapt to climate change impacts are exacerbated by the lack of sustained support from relevant government institutions. There are a number of government agents who are expected to collectively contribute towards overall rural development. Therefore, these government agencies should collaborate. Rural development is a function of an integration of interventions from different but related government agents involved in areas such as: land development and delivery; agriculture; natural resources management; water resources development; social welfare services; road infrastructure provision; health services and education among others.

To have a climate resilient agricultural system and sustainable rural livelihoods, there must be a comprehensive institutional framework for integrated capacity building towards sustainable rural development and livelihoods. The capacity building framework must ensure a coordinated vertical integration in terms of policy delivery, strategies, programs and projects from the national, provincial, district up to the local village level.

The capacity building initiatives must involve a good governance framework as a primary public service delivery instrument. Specifically, the concept and practice of climate change response governance must be introduced. Such governance is anticipated to promote decentralization and strengthen partnership among government agents, the private sector, international development partners, NGOs and the community in national and local development initiatives that are climate-smart and resilient. There must be some comprehensive plans for agricultural development and food security enshrined in the national development and poverty reduction strategies at various scales. A combination of good governance, public-private partnerships and community-based climate response strategies will help to strengthen climate response capacity. Capacity building in this regard must involve infrastructure development and sustainable land management (SLM) which incorporates issues such as: land husbandry; water resources and micro-irrigation management, pasture and forest management; and ecosystem restoration among other initiatives.

There is a need for national and local government authorities to put in place a framework that allows a multi-stakeholder approach in addressing agricultural and environmental management challenges being faced by the Makonde communal farmers. With a coordinated approach led by AREX, the Forestry Commission and EMA, in association with other relevant governmental and NGO agents, there is need for outside intervention to regulate the local livelihood activities and practices on the local agro-ecosystem. The study, therefore, recommends strengthening the combination of agricultural, environmental and climate change education to smallholder farmers as a prerequisite to the new vision of sustainable agricultural intensification. This implies a rural livelihoods system that seeks to increase farming yields and sustaining har-

vests without degrading the ecosystem services that underpin the production systems, practices and local human wellbeing. Specific initiatives to promote sustainable agricultural intensification may include: crop diversification towards more drought resilient varieties; soil and nutrient management; (rain) water harvesting and micro-scale irrigation; conservation agriculture, intercropping and crop rotation; agro-forestry and agro-biodiversity.

Overall, there is a need to mainstream climate change in all programs and plans for institutional capacity building and integration, fostering cross-dialogues between relevant agencies and institutions involved in rural development. Agricultural development, food security and poverty reduction policies, programs and plans must all be climate sensitive and climate smart. This will ensure stronger alignment of development investments with environmental sustainability and climate change adaptation needs to the benefit of the rural farmers in the Makonde communal lands.

The combined outcomes of the named practices will help to eliminate unsustainable agricultural practices through village-based sustainable land management system (SLM) that ensures land is used for its best economic and ecosystem services. The approach must promote community participation and empowerment and in the process, creating a mosaic of diverse but integrated practices to boost agricultural production, sustained ecosystem productivity and strengthening livelihoods.

The proposed multi-sectoral approach in rural development and climate change adaptation strategies will help to add impetus to Zimbabwe's current efforts to attain the United Nations Millennium Development Goals. This is particularly the case with goals on; the eradication of extreme poverty and hunger, promotion of gender equality and empowering women, reducing child mortality, ensuring environmental sustainability and developing a global partnership for development.

Given the fact that the human-environment interface is in a state of continuous interactive transformation, the need for further research on this dynamic system is unquestionable. For further researches, the study suggests attention on the exploration of connections between sustainability, risk and uncertainty. Climate change

and human sustainability are characterized as the challenge of managing change in dynamic systems riddled with uncertainty.

Future research on vulnerability, adaptive capacity and adaptation will remain of great utility to the wider research community especially seeking to answer the questions such as:

1. What should be of primary concern in research between biophysical and social vulnerability to climate change, or can there be a fair balance between the two without overlooking the other?
2. At what scale should adaptive capacity to climate change be in terms of research scope and what is the dividing line especially considering the role of exogenous factors in facilitating or inhibiting the realization of sub-system capacity to climate change adaptation?

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