



MIDLANDS STATE UNIVERSITY

FACULTY OF ARTS

DEPARTMENT OF DEVELOPMENT STUDIES

**AN ASSESSMENT OF CLIMATE CHANGE ADAPTATION STRATEGIES FOR
CHIRUMANZU DISTRICT**

BY

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of the Bachelor of Arts in Development Studies Honours Degree*

SUPERVISION ACKNOWLEDGEMENT FORM

The undersigned certify that they have read and recommended to the Midlands State University for acceptance, as a dissertation entitled: An assessment of climate change adaptation strategies for Chirumanzu District.

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DECLARATION

I Cynthia Rutendo Gota hereby solemnly declare that this research is my own work and is not reproduction of someone else's work, unless otherwise acknowledged.

Signature

Date

DEDICATION

I dedicate this to the Lord Almighty who has made it possible for me to come up with this academic presentation. I also dedicate it to the special gifts that God graced me with, that is my loving mother and father, who have been my pillar. I love you!

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ABSTRACT

The aim of the study was to look at the effectiveness of climate change adaptation strategies in Chirumanzu District. The study took into cognizance the fact that climate change has affected the livelihoods of communities and sought to find out how communities have adapted to climate change. Qualitative approach was used as it gave vivid descriptions of climate change impacts, community response and adaptation. Interviews, focus group discussions and observations were the tools implored in gathering data from respondents which was analyzed using the sustainable livelihood approach. The study showed that there is evidence of climate change in the district and community based adaptation is the dominant strategy. Adaptation strategies in the district were successful in curbing the impacts of climate change on agriculture which is a major source of livelihood in the community. The study recommended that various actors be implored if effective adaptation programming is to take place.

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ACRONYMS AND ABBREVIATION

AEZ	Agro Ecological Zones
AGRITEX	Agriculture Technical Extension Support
CBA	Community Based Approach
FGD	Focus Group Discussion
FAO	Food and Agriculture Organization
INDC	Intended National Determined Contributions
IKS	Indigenous Knowledge Systems
MSU	Midlands State University
NCCRS	National Climate Change Response Strategy
SDG	Sustainable Development Goals
UNFCCC	United Nations Framework Convention on Climate Change

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BACKGROUND TO THE STUDY

Climate change is one of the major threats to sustainable development with multiple adverse impacts on environment, food security, human health, economic activities, natural resources and physical infrastructure. Climate change, according to The United Nations Framework Convention on Climate Change (UNFCCC) Article 1 refers to the change of weather patterns which is strongly linked directly or indirectly to human activity which alters the makeup of the global atmosphere over a considerable time period (<http://unfccc.int>). It is important to note that there is no one single definition of climate change, the term, is usually made in reference to changes in weather patterns that are induced by human activity, such as the emission of greenhouse gases and aerosols, which are causing extensive shifts in weather patterns.

The world over is experiencing a shift in weather patterns owing to the impacts of climate change. Africa, in part, is already under pressure from climate change stresses and is highly vulnerable to the impact of climate change (Madzvamuse 2010). Climate change has a negative impact on development and there is need for urgent climate change action if any considerable development is to take place in the world and Africa, as clearly enshrined in the Sustainable Development Goal 13 which calls for nations to take part in climate action. The impacts of climate change in Africa are already being felt in Zimbabwe as the country has been the hardest hit, as it is more vulnerable to climate change owing to its highly variable climate, widespread poverty and limited coping capacity. Agriculture, rural livelihoods, sustainable management of natural resources and food security are inextricably linked within the development spectrum and climate change challenges of the twenty-first century. The impacts of climate change in

Zimbabwe particularly the increase in rainfall variability make it difficult for people who depend on rainfall for water resources, (Brazier 2015). The National Climate Change Response Strategy (2015), states that, Zimbabwe has witnessed climate change as it has experienced a warming trend towards the end of the twentieth century compared to the beginning with mean temperatures increasing by about 0.4°C. Chirumanzu district being housed in Zimbabwe is in this calamity.

Chirumanzu district is found in the central parts of Zimbabwe in the Midlands province and lies within the natural farming regions 3 and 4 which are characterized by great aridity (Mugabe et al 2012). Chirumanzu receives very low, erratic rainfall, not more than 300mm per annum, experiencing cold dry winters and hot summers which becomes wet in November (Mupaso et al 2014). As a result of these climatic changes of increase in temperatures and decrease in rainfall, Chirumanzu has become one of the most vulnerable communal areas in Zimbabwe.

Agriculture, in Chirumanzu District is rain fed and agriculture remains the dominant economic activity with little or no other economic activities, making the community more reliant on farming in order to sustain their livelihoods. The area is heavily characterized by communal farmers who struggle to develop climate change coping mechanisms with the worsening erratic rainfall distribution patterns. A series of climate change induced droughts and water shortages have been experienced in Chirumanzu. Food insecurity is a major source of vulnerability at household and community level in Chirumanzu. In addition the area experiences water shortages towards the rainy season making it difficult for agriculture to thrive, loss of livestock, health

problems which threatens lives and livelihoods. People in Chirumanzu mostly children, women and the disabled among the rural poor are bearing the brunt of climate change. Climate change induced droughts have resulted in food insecurities resulting in hunger and dependence on food aid. Clean water has become scarce resulting in humans and animals competing for the precious liquid. Children and the elderly are exposed to heat stress due to increase in temperatures. Urban migration has also been on the rise as most men and young people move to nearby urban areas to seek employment since agriculture has been disrupted and is no longer viable. This has social impacts since it over burdens women who are left behind to look out for the families. Women and children are exposed to emotional and physical abuse.

Several adaptation strategies and practices have been developed over the years in the district to reduce the effects of climate change at household and community level. The research sought to assess the adaptation strategies being implemented in Chirumanzu all was done in a bid see if they respond to and are consistent with sustainable livelihoods that are, safeguarding food security and rural livelihoods. It has to be noted that poverty and social vulnerability combined with climate change have had great repercussions on the vulnerable groups of the society that is children, women and the disabled. The researcher's major concern was adaptation mechanisms that have been developed to respond to the challenges facing the agricultural sector. The adaptation mechanisms include use of indigenous knowledge systems, adoption of small grain varieties, drought resistant crops and use of organic farming methods and practices. It therefore was imperative for the researcher to assess and ascertain these adaptation strategies to evaluate their effectiveness in ensuring households' coping abilities to the effect of climate change.

Statement of the Problem

Chirumanzu district is currently facing the following problems as a result of climate change: Increasing variability in the onset and duration of summer rainfall, a notable decrease in average annual rainfall, drying up of perennial and other important water sources, increases in the numbers of new pests and pathogens and changes in their timing affecting crops and livestock, increased risk of veld fires, increases in livestock deaths, declining yields of the staple maize crop, increased burden on women and children as they walk longer distances to fetch water, extinction of wetlands and decrease in vegetation cover among other climate change impacts. A number of adaptation strategies have been put in place at global, regional, national and local level; therefore it was imperative for the researcher to look at their impact and effectiveness in Chirumanzu District.

Research Objectives

1. To assess the impact of climate change in Chirumanzu District.
2. To assess the level of community participation in climate change adaptation strategies in Chirumanzu District.
3. To assess the level of success of climate change adaptation strategies in Chirumanzu District.

Research Questions

1. What is the impact of climate change in Chirumanzu District?
2. What has been the level of community participation in climate change adaptation strategies in Chirumanzu District?
3. What has been the level of success of the climate change adaptation strategies in Chirumanzu District?

Significance of the study

This research was aimed at assessing climate change adaptation strategies implemented in Chirumanzu District. The research will help in mainstreaming climate change issues in all development issues in Chirumanzu district. The research will also assist development officers and residents of Chirumanzu in spelling out if sustainable livelihood would be achieved by climate change adaptation strategies being implemented in Chirumanzu. The findings of this research study may provide opportunities for further studies on climate change adaptation strategies which meet sustainable livelihoods in Zimbabwe and may contribute to knowledge development through the understanding and appreciation of climate change. The research will also help in sharpening the researcher's analytical and conceptual skills.

It is the hope of the researcher that the research will enrich the secondary sources of information for the Midlands State University (MSU). The research forms a firm foundation where future researches shall be laid upon and will assist the university in making their own research in the future. It will also contribute towards the data bank of the university and showing that MSU as

an institution is grooming research officers of tomorrow who will be in a position to carryout research projects.

Theoretical Framework

The research is anchored on the Crisis Decision Theory. The theory simply explains how individuals, groups, or communities respond to situations in the face of negative events. The theory provides a critical link between theories of stress, coping and decision making research in the face of crisis. The theory gives a clear basis of assessing climate adaptation strategies in Chirumanzu District. In the case of Chirumanzu, the theory provided a basis for understanding the impacts of climate change in Chirumanzu and a clear framework for analyzing the response (adaptation strategies) that have been implemented in order to assess their effectiveness.

According to Sweeny (2008), Crisis Decision Theory addresses two major questions regarding how people or community's decision making processes occur in the face of negative events and the factors that predict response choice. The two major factors are then sub divided into three stages which include: assessment of the severity of the negative event, determining the response options and lastly evaluation of the response options.

In the first stage, communities look closely at the severity of the negative event. Information about the causes, potential harm or consequences is sought. Information with regards to how other communities, individuals or groups who were in a similar situation responded is also compared and taken into cognizance in relation to their crisis. Sweeney (2008) states that the

perceived risk is also carried out concerning others who were in a similar situation; severity of the crisis plays a pivotal role in the response that communities choose.

Furthermore, determining available response options is the second stage in crisis decision theory. The stage is when people ask themselves how they can respond to a problem. Sweeney (2008) argues that this stage is when people device plans as to how they can solve the situation at hand. Folkman et al 1986, Lazarus and Folkman 1984) are of the view that the stage is also when people look closely at their resources to determine their coping strategies. Likewise, this stage is fundamental in analyzing adaptation strategies in dealing with the problem of climate change in Chirumanzu District.

The third stage in crisis decision theory is evaluating the response options available. At this stage each response option is weighed and the advantages and disadvantages of each option are analyzed. Thus, the theory provides a fundamental guide to the assessment of Climate Change Adaptation Strategies in Chirumanzu District. Through the three stages, the researcher was able to look closely and assess the effectiveness of the coping strategies in Chirumanzu District where as highlighted in the final stage, the researcher weighs pro and cons of available options, this clearly showed the central part of the research that the researcher carried out, wanted to find out whether the adaptation strategies in Chirumanzu District are sustainable. Thus, indeed the theory provides a firm foundation in the analysis of Climate Change Adaptation strategies in Chirumanzu District.

Conceptual Framework

As was alluded to earlier, the major thrust of the research was to assess climate change adaptation strategies implemented in Chirumanzu District. The major variables of the research were climate change and adaptation strategies. Smith et al (1996) says that adaptation to climate change includes all adjustments in behavior or economic structure that reduce the vulnerability of society to changes in the climatic system. It has to be noted that adaptation is necessary to limit potential risks of the unavoidable residual climate change now and in coming decades. Smit et al. (2000), also goes on to argue that adaptation is a response to potential environmental changes that affect given entities and systems. Climate change adaptation strategies are thus an attempt to respond to changes in climate being brought about by the disastrous effects of climate change.

In the light of the above, and for the purposes of this research, climate change adaptation strategies refer to the mechanism that have been put in place in order to respond to the impacts of climate change. In order to measure the success of the adaptation strategies, the researcher used the sustainable livelihood approach; the approach gives a fundamental guide to the indicators of a sustainable livelihood, which also pinpoint to measuring the success of adaptation strategies. In this case, the researcher was arguing that if Chirumanzu District is able to sustain itself by providing itself with the necessary services that point to a sustainable livelihood, then the adaptation strategy that would have been used to sustain that livelihood becomes effective. The sustainable livelihood approach provided the best framework for measuring adaptation strategies in Chirumanzu District.

The sustainable livelihood approach provided the researcher with indicators that pinpointed to the effectiveness of the coping mechanisms that are being carried out in Chirumanzu District to cope with the effects of Climate Change. A 1997 White Paper on International development defines SLA as follows“...refocus our international development efforts on the elimination of poverty

and encouragement of economic growth which benefits the poor. We will do this through support for international sustainable development targets and policies that create sustainable livelihoods for poor people, promote human development and conserve the environment” DFID (1997: Summary, page 6).

Chambers and Conway (1992) give sustainable livelihoods as

“A livelihood comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living; a livelihood is sustainable which can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long-term.”

Assets (capitals) of sustainable livelihood as referred to in the definition above according to Scoones (1998) include things like natural capital, human, economic or financial capital, physical capital and social capital. Odero (2006) suggested information capital to be included

amongst the assets. Ownership of these assets is not necessarily important. Access to the asset is considered of great importance than ownership if sustainable livelihood is to be achieved. It is thus the thrust of this research to assess whether the climate change adaptation strategies being implemented in Chirumanzu support sustainable livelihood. Adaptation livelihoods in Chirumanzu must not only help the community to recover from stress and shocks but must also help in maintaining and enhancing capabilities and assets for the present Chirumanzu Community and for future generations.

The researcher, focused on indicators of climate change adaptation strategies which include agriculture resilience, where the researcher assessed agriculture production in relation to food security. Moreover, the researcher also assessed availability and proximity of clean water sources for domestic use and also for livestock and off rain season as an indicator. The ability of Chirumanzu community to find alternative energy sources thereby reducing stress on natural environment that is forestry resources. Movement of people from rural to urban areas will also be another indicator in this research. The researcher was able to look at how the adaptation strategies managed to reduce urban migration as a result of adverse impacts. The coping capability of people in Chirumanzu to adapt to climate change will be used to evaluate the adaptation strategies guided by the sustainable livelihoods approach.

Research Methodology

Research Approach

The researcher used the qualitative approach in assessing climate change adaptation strategies in Chirumanzu District. The qualitative research approach was the best approach as it gave an in-depth description of how people are experiencing the impacts of climate change and how they have responded to the impacts of climate change. Scholars have argued that the strength of qualitative research is in its ability to provide complex textual descriptions of how people experience a given issue. In the case of this research, the researcher was able to have an insight on impacts of climate change and the adaptation strategies that the community of Chirumanzu has adopted. Hancock (2002) also argues that qualitative research dwells more on coming up with explanations of social phenomena. Qualitative research aims to help us to understand the world in which we live and why things are the way they are. It is concerned with the social aspects of the world and seeks to answer questions about behaviors of people, formation of attitudes and opinions and how people are affected by the events taking place around them. Qualitative research provided the best methodology in assessing adaptation strategies in Chirumanzu, through the exploration of how people are affected by events (in this case events to the researcher being climate change), the research was able to have a clear picture about the impacts of climate change and the adaptation strategies that have been employed in Chirumanzu District.

Research Design

The research was mainly focused on climate change adaptation strategies in Chirumanzu District, therefore making the research a case study of the area. Case study as research design offers a richness and depth of information not usually offered by other methods. Thus the method

presents clear in depth information about climate changes adaptation strategies being implemented in Chirumanzu District. Yin, (1989) argues that case study provide a rich picture of what is happening, as observed by many individuals. Owing to the versatile nature of case study, Hancock (1998) argues that the method is able to capture as many complex variables and brings them together to produce a particular manifestation. Case studies can provide very engaging, rich explorations of a project or application as it develops in a real-world setting which thereby presented the researcher with the basis for analyzing climate change adaptation strategies in Chirumanzu District.

Population and Sampling

Random sampling techniques will be used to select the participants for this research. Panneerselvan (2004) says random sampling is a form of probability sampling which enables each unit of a population to have the same probability of being selected as a unit of sampling. Chirumanzi district is a large and homogeneous population. It has a total of nineteen wards, twelve of them are communal, while three are urban, new resettlement and old resettlement respectively. One ward will be selected from the communal ward, new resettlement and old resettlement wards and from each ward, five villages will be selected for sampling. A Ward is an administrative unit made up of six to seven villages (Madzudzo, 1997). Selection of households will be done randomly targeting ten households in each village. Williman (2005) says that random sampling gives the most reliable representation of the whole population and it is free from bias.

Data Collection

Chiromo (2004) says that data collection is the gathering of information needed to address a research problem. These are steps taken in administering instruments and collection of data from subjects under study. This researcher employed the following techniques, focus groups discussions, observation, interviewing key informants district administrators, village headmen, agricultural extension officers, villagers themselves as well as organizations working on climate change issues in the district and also secondary data was also employed by the researcher.

Interviews were used to augment data collected from already published literature from academics and Government documents. Interviews enabled the researcher to collect primary data. Interviews were helpful in capturing different dimensions of understanding the extent of climate change adaptation strategies in Chirumanzi District. Interviews were also useful to the researcher, as they provided probing further where extra information was required, which in turn resulted in her having a deeper understanding of climate change and adaptation strategies in Chirumanzu District. Since qualitative research requires greater interaction and involvement of the researcher, in depth interviews with village householders were conducted in order to establish the extent to which climate change has affected their livelihoods and also to establish the mechanisms that they put in place in order to adapt to the impacts of climate change. Furthermore, project implementers on climate adaptation were also interviewed in order to establish adaptation strategies that have been put in place in Chirumanzu District.

Patton (1990) asserts that, observational techniques are methods that the researcher engages in, in order to gather firsthand information concerning the research under study. Henceforth, the researcher observed the livelihoods of the Chirumanzu Community and the adaptation strategies that they have put in place in dealing with climate change. This enabled the researcher to have an insight on whether the adaptation strategies are viable and sustainable. By observing their lifestyles, the researcher was able to tell whether adaptation strategies in Chirumanzu District are in tandem with maintaining a sustainable livelihood, which is the basis that the researcher is using in assessing the adaptation strategies.

Furthermore, according to Modell (2007) focus group discussion (FGD) refers to a group of similar respondents who engage in discussion about a specific topic under the direction of an interviewer. Each FGD consisted of 5 participants. In these FGDs the researcher facilitated, moderated, monitored and recorded the responses of the participants. FGD take place between the researcher and groups of individuals selected from public and private organizations. The researcher directed questions to the participants.

Moreover, secondary sources are also a tool that the researcher used in carrying out her research. Jewel (2001) defined secondary data as the data that has already been collected by and is readily available from other sources. The researcher used such data sources namely from the internet, electronic journals, text books and research papers. There is a lot of literature on climate change and climate change adaptation strategies and the researcher used such data. Such data was also advantageous since it was cheaper, quicker and easy to obtain as compared to primary data.

Data Analysis

Data was analyzed using the sustainable livelihood approach. The indicators of a sustainable livelihood which include income, food security, access to clean water services and agricultural resilience were used as basis of analyzing the effectiveness of adaptation strategies in Chirumanzu District. The data was analyzed in a past and present situational analysis, where a comparative was done in terms of their income levels, food access, clean water access and agricultural resilience before they had adapted to climate change and the present situation when they are carrying out adaptation strategies.

Ethical Considerations

The researcher paid particular attention to confidentiality during the research. All information was collected in confidentiality and reported in anonymity. Belmont Report (1974) upholds the aspect of confidentiality during research where the report highlighted that respect for individuals, should prevail during research. The researcher upheld this during her research, this proved to be advantageous to the researcher as she was able to build trust with the participants which in turn was beneficial in obtaining as much information. The researcher also upheld the laws of the land, as she sought permission to interview participants from the Chirumanzu Rural District Officer, village headmen and the chief.

Literature Review

In this literature review, the researcher acquaints herself with various literatures that have been propounded by scholars, concerning the issue of climate change and adaptation strategies. The literature review is aimed at finding out what scholars have to say about climate change

adaptation strategies. The literature review will review literature concerning climate change adaptation strategies as to what scholars think about effectiveness of various adaptation mechanisms. Literature was retrieved based on key indicators of an effective adaptation strategy and also from key objectives that needed to be addressed in the research.

There is a lot of literature that has been documented on climate change. The literature that is available does not pin point much about climate change adaptation strategies in Chirumanzu District. Significant research has been carried out in Murehwa, Chivi and Seke. Mudombi, S. & Muchie, M., (2013) in a research weighed the opinions of rural household heads with regard to various aspects of water access and climate change in Seke and Murehwa districts. The research sought to evaluate whether there were significant differences in perceptions of respondents from female-headed and male-headed households. The research found out that the majority of both female-headed and male-headed households relied on rainfall for their crops, rivers were cited as the main water source for their livestock and protected wells water for household use. The general perception was that there would be less water available in future, with a greater proportion of female-headed than male-headed households perceiving such difficulties.

A study by Manyeruke C, et al (2013) examines the widespread effects of climate change and variability on food security in Zimbabwe. The research went further to analyze how the shortage of food and depletion of water resources could result in conflicts which may influence shifts in the country's balance of political power. In addition Mudombi-Rusinamhodzi G, et al (2012) analyzed the factors affecting responsiveness of smallholder farmers to climate variability

induced hazards. The results of their study revealed that productive assets had influence on responsiveness, but perceptions did not influence responsiveness.

This study adds to the analysis by assessing climate change adaptation strategies in Chirumanzu District. The study sought to show how the adaptation strategies were inclusive of all members in society especially women, children and the weak in society. Downing et al (1997), argues that for adaptation to be effective, vulnerable groups, also need to be incorporated. Manyeruke (2012) concurs with this, saying that failure to integrate vulnerable groups often leads to failure to adapt and often leads to significant deprivation, social disruption and population displacement, and even morbidity and mortality. Thus this research adds to the analysis by showing how important it is for an effective adaptation strategy to include vulnerable groups.

Furthermore, it has also been noted that the impacts of climate change are experienced differently by various people, groups of people and communities. Kaswan (2013) is of the opinion that the general perception of climate change hazards is that indeed they affect everyone, but children, women and the disabled are extremely vulnerable to the effects of climate change. According to Nelson et al (2009) about 75% of the world's population live in rural areas and agriculture is their main sources of livelihood. However, agriculture in rural areas is mostly hampered by the lack of proper infrastructure such as water systems. Physical weather, social and economic conditions under which different people live contribute to their vulnerability to the impacts of climate change. This clearly puts to light the fact that a one size fits all approach to adaptation strategies is less effective in dealing with climate change adaptation. Thus this will

add to the research in clearly bringing out the special needs in adaptation that Chirumanzu as a District requires.

Several works have been implored on the need to pay particular attention to gender when assessing climate change and adaptation strategies. Chief among these are Angula (2010:37); Carvajal-Escobar, Quintero-Angel & Garcia-Vargas (2008:279); Nair (2012:10); Nelson et al. (2002:56); Parikh (2007:4); Swiss Agency for Development and Cooperation (2005:9); UNDP (2009:25) and UNDP (2010:6) who have voiced their concern against the perpetuation of gender inequality in climate change adaptation strategies. It is the thrust of this research to assess whether adaptation strategies are also catering for the vulnerable in society as literature has shown that exclusion of certain group of people will often result in adaptation strategy that would have been put in place to be less effective.

This research gives special focus to the adaptation strategies which are being implemented in Chirumanzi in order to avert the effects of climate change. Adaptation to climate change is necessary in dealing with the potential unavoidable risks of climate change in years to come. Smit et al. (2000), in defining adaptation says it is a response to environmental changes that affect systems. Climate change adaptation strategies are an attempt to respond to changes in weather patterns being brought about by the disastrous effects of climate change.

Smith et al (1996) says that adaptation to climate change includes the reduction in vulnerability by promoting resilience through adjusting all alterations in behavior or economic structure. Adaption strategies can be classified into two categories which are coping strategies and adaptation strategies. Coping Strategies are the set of strategies which the farmer has evolved over time through experience in dealing with the current known and understood natural variation in weather whilst adaptation strategies are longer-term (beyond a single rainfall season). Given the above it is thus very vital to distinguish between coping strategies and adaption strategies as failure to do so devalues the research.

Brooks (2003) brings an interesting view in climate change adaptation strategies. He distinguishes between actual adaptation and adaptive capacity. This line of thinking is also further explored by Kelly and Adger (2000), Turner et al. (2003); Smit and Wandel (2006); Gallopín (2006), O'Brien et al. (2007); Füssel (2007b); and Nelson et al. (2007). The distinction between the two is the potential for adaption that does not necessarily become real. According to Adger and Barnett (2009) adaptive capacity does not automatically lead to actual adaptive action. This is a good point of analysis for assessing the climate change adaptation strategies being done in Chirumanzu. To this end it then means that actual adaptation is strongly hinged upon technological advances, institutional arrangements, availability of financing, and information exchange (Watson et al. 1996). Grothmann and Patt (2010) concur with this, as they found farmers in Zimbabwe hesitant or even resistant to take adaptive actions because they had not learned how to correctly interpret climate-related probabilities and they preferred to plant (and eat) maize over millet (the proposed strategy for drought years).

The African Climate Change Resilience Alliance (ACCRA) (2010) consortium identified five characteristics of adaptive capacity, and one of the characteristics is knowledge and information. It highlights that successful adaptation requires information and understanding of future change, knowledge around adaptation options, whereby it is important to ensure that systems are in place to distribute relevant information at both national and regional scales e.g. early warning systems; meteorological data and forecasting; and climate impact data. Mutekwa (2009) studied climate change impacts and adaptation in the smallholder sector in Mazvihwa area of Zvishavane District in Zimbabwe, and the findings were that the majority of the farmers (53%) professed ignorance about climate change and its potential consequences, whilst 47% indicated that there was some kind of change that they had observed in recent years.

Klein *et al* (2001) cited in De Jonge (2010) brings an interesting view that either adaptation or mitigation is effective in reducing human and natural environmental systems risk to climate change. However, Chagutah (2010) argues that the Kyoto Protocol governs the countries' reductions in the greenhouse gas emissions but these reductions will not lead to direct stabilization due to time lags offering adaptation as the best option to respond to climate change. This is further supported by Gbetibouo (2009) who argues that without adaptation, climate change is generally detrimental to the agriculture sector. Thus making the rest of the literature review clear of analyzing the effectiveness of adaptation strategies, with various literature indicating that adaptation strategies are indeed effective.

Incorporating Indigenous Knowledge System (IKS) into Climate Change Adaptation Strategies has proved to be effective in adapting to climate change. Robert and Hernert (2001), agree that

Indigenous Knowledge Systems are cost effective, participatory and sustainable. Studies carried out in Nigeria, Zambia and Zimbabwe also indicated this. Farmers have several indicators for rainfall in Zimbabwe through IKS as postulated by Mugabe et al (2010).

Furthermore, a study on climate governance by Heinrich Böll Stiftung in Botswana, Kenya, Nigeria, Tanzania, Uganda, South Africa and Zimbabwe indicated that a lack of appropriate legislative and policy frameworks inhibits the implementation of adaptation and constrains adaptive capacity in Zimbabwe. Madzvamuse (2010) supports this and says, Zimbabwe's environmental policy-making process has involved minimal engagement between civil society, policy-makers and the public, and he noted that though the process has been described as highly participatory, no record of public engagement exists. McDevitt (2009) concurs with this and says there is a danger that national adaptation strategies formulated without the participation of those intend to adopt the practices will limit rather than facilitate adaptation and potentially cause maladaptation.

The literature review showed that adaptation strategies are indeed effective in dealing with the effects of climate change. The literature reviewed, revealed that information dissemination, technological advancement and inclusion of vulnerable groups in climate change programming is vital in ensuring that there is effective adaptation.

CHAPTER ONE

EVIDENCE OF CLIMATE CHANGE IN CHIRUMANZU DISTRICT

Introduction

The chapter is set to show how climate change has resulted in a crisis for Chirumanzu Community. Chirumanzu Community, whose agricultural activities could support their livelihoods has gone under threat as a result of climate change. The researcher is set to illustrate how climate change has affected rainfall patterns, farming activities, vegetation cover, water sources and the general livelihoods of people in Chirumanzu District. Though the main thrust of the section is to look closely at the evidence of climate change in Chirumanzu District, the researcher will also briefly look at climate change in Zimbabwe so as to have a clear understanding of climate change in Chirumanzu District.

An overview of Climate Change in Zimbabwe

The phenomenon of Climate Change has raised concern in Africa and the International community at large. Changes in rainfall patterns, increases in temperatures and the general shifting of seasons have ultimately raised alarm in the International system as to the possible dangers that climate change is posing. Scholars have argued that Sub Saharan Africa, owing to its over heavy dependence on rain fed agriculture is at risk to the impacts and effects of climate change. Zimbabwe, being housed in Sub Saharan Africa is in the same calamity. There is strong evidence that climate change is indeed taking place in the country and there is great need to address its effects.

Zimbabwe has been subject to excruciating extreme temperatures ranging from 35°C (Brazier 2015). The country has experienced a number of heat waves over the years as a result of climate change. Brazier (2015) also goes on to say that surface temperature has increased by 0.4°C in the country. The country has been experiencing fewer cold days and more hot days. In addition, Moyo (2012) states that rainfall in turn, has decreased by 5% since 1900 and rainfall patterns are ever changing with average rains occurring at the beginning of the season in October and less than the average in January and March. Brazier (2015) projects a further 38% decline in national per capita water availability by 2050.

Furthermore, Manyeruke (2013) argues that global warming has caused an increase in the average temperatures resulting in the shifting of the traditional farming seasons and agro-ecological zones (natural regions). During the 60s, 70s and 80s, droughts recurred after every 10 years. However, this trend has ceased due to the rapid changes in climatic conditions that have made the rainfall pattern across the country more unreliable and difficult to predict. By the mid-90s the frequencies of droughts and dry spells had increased to every 4-5 years and by the late 90s, the country began witnessing alternating wet and dry years every three years. Since 2000, the country's situation has worsened as droughts have become more successive from 2002-2003, 2004-2005 and 2007-2008. This has ultimately affected food production in the country as the country mainly relies on rain fed agriculture in maximizing productivity.

Zimbabwe's agro-ecological zones (AEZ) have moved drastically because of the staggering impacts of climate change and global warming. Zimbabwe is characterized by five AEZs (regions 1-5) and majority of the farming is practiced in ecological regions 1, 2 and 3 which have

good climatic conditions for crop production. Regions 4 and 5 are characterized by low yearly precipitation and include the country's low lying territories, known as the low veld. An examination that carried out by Mugandani (2012) denotes that major shifts have happened in the drought prone regions 4 and 5 which have become drier than already experienced. As per the exploration, noteworthy changes have been experienced about the size, structure and creation of the five natural regions.

To add on, the two main food producing regions in Zimbabwe, that is, AEZ 2 and 3 have shrunk significantly. The shifting of natural regions boundaries observed in Zimbabwe strongly points to climate change and variability. Region 2 has shrunk by 49% while region 3 has shrunk by 14% (Moyo 2012), these changes in size of region 2 and 3 point to a possible reduction in food production and thus problems of food security in Zimbabwe. The dry regions, that is, region 4 and 5 have expanded by 5.6% and 22.6% respectively (Mugandani et al, 2012). This is clear testimony that there is evidence of climate change in Zimbabwe as climatic conditions are drifting towards arid conditions. Zimbabwe has an agro-based economy that heavily relies on agriculture. Thus climate change will have serious reparations on food security in the country.

Evidence of Climate Change in Chirumanzu District

Chirumanzu District, which is housed in the Midlands Province of Zimbabwe, lies in the Agro Ecological Zone (AEZ) three and four which is heavily characterized by great aridity and erratic rainfall patterns. Since Zimbabwe is being affected greatly by climate change, Chirumanzu, being housed in Zimbabwe is in the same calamity. There is strong evidence that the district is facing serious problems as a result of climate change. The District relies more on rain fed

agriculture and owing to the effects of climate change; agricultural activities have been greatly affected. The effects of climate change are depicted by the occurrence of droughts in the area, delayed erratic, short rainfall patterns, depletion of water sources and vegetation cover. All this, has ultimately affected the livelihoods of communities in Chirumanzu District as they rely on rain fed agriculture for their livelihood sustenance.

As has been alluded to earlier, Chirumanzu District lies in the Agro Ecological zone 4 and a small fraction of it lying in zone 3. The zone is heavily characterized by great aridity, with high temperatures and sporadic rainfall patterns. Climate Change has aggregately affected the region, as the regions aridity is increasing. Mugadani et al (2012) argues that the dry regions, that is, region 4 and 5 have expanded by 5.6% and 22.6% respectively. These changes in size of region four and five point to a possible reduction in food production and thus problems of food security in Zimbabwe. This makes it crystal clear that Chirumanzu District climatic conditions are drifting towards relatively arid conditions that are not favorable for agriculture. Chirumanzu District mainly relies on rain fed agriculture to sustain its main economic activity.

Furthermore, as a result of the shifting agro ecological zones owing to climate change, food production in Chirumanzu has also been affected. Chagutah (2010) argues that research has asserted that by 2050, average crop yield in Sub-Saharan Africa will go down by between 30 percent and 50 percent. This paints a gloomy picture for the region's food security and calls for a regional and more integrated approach in mitigating the impact of climate change. There is strong evidence that climate change has occurred as its manifestations are being felt by the increasing food shortages in Zimbabwe and as Chirumanzu is housed in Zimbabwe has also

fallen in this calamity. Climate change has greatly affected agriculture in Chirumanzu District. Moyo et al (2014) in a research carried out in Chirumanzu District clearly postulates that in the turn of the millennium, farmers in the district have recorded declines in maize production as opposed to the period just before the turn of the millennium where farmers would at least harvest twenty five bags of maize meal, but in the present years are even lucky to get five bags of maize, all this as a result of climate change. This further puts to light how climate change has disrupted the socio economic activity of Chirumanzu District, since they mainly rely on rain fed agriculture for maize meal production and ultimately their food security.

In addition, the effects of climate change are now manifesting and having an impact on the livelihoods of communities in Chirumanzu District. Mugabe et al (2014) noted that Climate Change has resulted in a number of school dropouts as incomes of people in the District have been disrupted since agriculture has been the backbone of their economic activity. Through interviews that were carried out by the researcher, the researcher found out that climate change has disrupted agricultural activities and in turn farmers professed that they are unable to produce anything owing to climate change. This clearly shows how climate change has manifested itself in Chirumanzu District as it has resulted in large school dropouts as many of the farmers in the region are unable to send their children to school because the little income that they used to have is no longer there. Thus putting it to light that climate change is real in Chirumanzu District.

Moreover, changing sporadic rainfall and rising unbearable temperature changes indicates that there is indeed climate change in Chirumanzu District. Mugadani et al (2012), argues that farmers in the area no longer know when to plant. Mugadani et al (2012) goes on to say that rain

keeps shifting and the rains have also been scarce during the start of the seasons in recent years. It has also been noted that if farmers in the area choose to plant early the crops in most cases are affected by the dry spells which are quick to follow as a result of the short rain season. The researcher observed that farmers experience losses as a result of opting to farm later as in most cases the rains stop before the crops mature. This clearly puts to light that climate change is having its detrimental effects on communities in Chirumanzu District.

High temperature and sporadic rainfall patterns have also resulted in scarce water supplies and 4water sources in the District. Sebakwe or Zibagwe River which provides the area with water is almost dry as a result of climate change as shown in Fig 1 below which was obtained from the reserachers field work.



Fig 1: showing evidence of the drying up of Sebakwe (Zibagwe) river.

In an interview carried out with farmers in the district revealed that under normal circumstances, the river ought to be from the period September to November, but has noted that climate change has affected the water source which once supplied water in the district. The researcher, through interviews with local people noted that before the turn of the millennium, the river system used to be full of water and it provided water for the District, but in recent years, owing to the impacts of climate change, the rivers have dried up. This calamity is further evidenced in ward 19, where there is only one borehole in the area, which provides water for domestic use and other agricultural purposes in the ward. Moyo et al (2012) points out that women in ward 19 are the most affected, as they travel long distances in search of water clearly putting to light that climate change poses serious water scarcity problems in the District. Estimations show that annual rainfall levels in Zimbabwe will decline by 60% by the 2080 and Argalwal (2010), points out that river flow rates in Sub-Saharan Africa will decrease by 70% by the year 2050. This further draws to the point that water scarcity will always be there and intensity will actually increase and a possible high level in the girl child school drop outs will be witnessed thereby providing testimony that Climate Change is indeed happening in Chirumanzu District.

Wetlands have also deteriorated in Chirumanzu District. Wetlands were present in areas such as Driefontein, Highlands, Fairfields, Chaka and Muwani areas of Chirumanzu District. However evidence shows that the wetlands are slowly drying up as a result of climate change. Ramsar Convention (1971) defined wetlands as areas with marshes, fern, wet grasslands, swamps or water whether natural or capital, permanent or temporary with water that is static or flowing. Hove et al (2013) postulates that wetlands are an important feature in the ecosystem as they

recharge rivers and water sources and they also act as reservoirs for dry water supply. Mugadani (2012) in a research carried out in the District found out that in villages four and five close to Musena were once characterized by flourishing gardens that were planted close to the wetland in Musena, but he noted with concern that the gardens were no longer flourishing well as a result of the effects of climate change in the District. Reports from the study indicated that they could no longer rely on water from the wetland as they had dried up thus disrupting a source of their livelihood clearly establishing the fact that climate change in Chirumanzu District needs to be addressed if the community is to survive the challenges and problems that result as a result of the phenomenon.

Biodiversity loss has also characterized Chirumanzu District as a result of climate change. Mugabe (2014) is of the view that there has been a general loss of vegetation cover coupled with the extinction and migration of some animal species is evident enough that climate change is occurring in Chirumanzu District. He noted that there is sound evidence that animals have migrated to new areas in search of water sources and pastoral lands as most of the pasture in Chirumanzu has become more of a desert. Flora has also disappeared as a result of climate change and in most cases it has been noted that some animals have died or have been killed by local people as source of food disregarding the existence of CAMPFIRE which promotes wildlife conservation and rural development. Thus the manifestation of climate change has had negative impacts on biodiversity in Chirumanzu District.

Chapter Summary

The chapter has highlighted the fact that indeed there is evidence of climate change in Chirumanzu District. Climate change has affected water supply, vegetation cover, and rainfall patterns and thus has disrupted agricultural activities which are a major source of livelihood for households as they rely on rain fed agriculture in the district. The knock on effect of climate change in Chirumanzu District is a major drop in food security levels, high rates of school dropouts as water sources have been affected. The chapter also gave a brief overview of that showed that there is climate change in Zimbabwe.

CHAPTER TWO

ADAPTATION STRATEGIES AND THEIR EFFECTIVENESS IN CHIRUMANZU

DISTRICT

Introduction

This chapter presents and discusses major findings of this study. The major sections of this chapter include a description of the adaptation strategies in Chirumanzu District. The researcher's findings will be guided by the sustainable livelihood approach, where the effectiveness of the adaptation strategy will be measured by it being able to maintain the communities' food security levels, water access, diversified economic activities, energy access and availability of extra income. The findings will be presented in a past and present situational analysis where the researcher looked at what used to happen before the adaptation strategies were implemented and what is happening today. The researcher will also give a general overview of adaptation strategies in Chirumanzu, before looking at them in detail.

Adaptation Strategies in Chirumanzu District

The researcher noted that the adaptation strategies being implemented in Chirumanzu District are mainly Community Based Adaptation (CBA) Strategies. According to the UNFCC (2007) adaptation is the process through which communities increase coping capabilities of an indeterminate future which involves taking changes in the reduction of the negative impacts of climate change which in turn promote resilience. Adaptation to climate change can be grouped into two broad categories which are (autonomous) indigenous response and planned responses. The researcher observed that the dominant adaptation strategy in Chirumanzu District is

Community Based Adaptation (CBA) which is enhancing sustainable livelihood options. The strategies that have been implemented in Chirumanzu District include improvements in water availability for agriculture through establishment of large scale irrigation schemes, rehabilitation of existing irrigation schemes, centralized community gardens, green houses, adoption of small seed grain and adoption of indigenous knowledge system just to mention but a few. The researcher, through observation and interviews carried out noted that though communities are adapting to the effects of climate change there seem to be lack of knowledge about the phenomenon of climate change.

Drought Resistant Crops

Intended Nationally Determined Contributions (INDCs) (2016), states that the long term adaptation strategies for Zimbabwe's most vulnerable districts include introducing crop types and varieties that are drought tolerant. The researcher found out that drought resistant crops are a major climate adaptation strategy in Chirumanzu District. Drought resistant crops such as sorghum, rapoko and millet have been introduced in Chirumanzu. Cowpeas and sesame have also been introduced in the District in order to curb the effects of climate change and adaptation. These type of crop varieties are resistant to dry climatic conditions and favorable for Chirumanzu little rainfall capacity. Despite dwindling rainfall patterns of less than 250mm (Moyo 2012) experienced in the district over the years, communities have still managed to maintain bumper harvests of about 1000 to 1200 kilograms per hectare of cow peas and sesame as a result of the shift to growing drought tolerant crops. Research carried out by health experts has found out that drought resistant crops have high nutritional value. One respondent highlighted the fact that cow peas and sesame have provided them with extra income for sustaining their livelihoods.

In light of the above, a farmer in ward 19 also noted that over the past years, they have been facing challenges in harvesting maize as a result of the poor erratic and sporadic rainfall patterns witnessed over the years. The farmer highlighted the fact that on average, they used to harvest 200 to 300 kilograms of maize per hectare which amount to four (4) to six (6) bags respectively. According to the farmer, this could hardly sustain their food consumption levels at household level to the next season. He highlighted the fact that on average a family requires one and a half bags of maize per month for consumption which meant that with the 4 to 6 bags of maize harvested per hectare, this could only sustain them for about 4 to 2 months leaving them food insecure thereafter. In most cases, this often led to the communities over reliance on food supplements from the government and non-governmental organizations working in the district.

However, the coming in of cowpeas and sesame has brought hope to the communities in Chirumanzu District as they are now able to obtain higher yields as compared to growing maize. The researcher found out that in ward 19 for example, farmers grew sesame and cowpeas. On average, according to records obtained from SIDELLA trading company, which is providing technical support and a ready market for their crops, for every hectare of sesame that the farmer planted, they are able to harvest 1000 kilograms (1 tonne) at most 1200 kilograms of sesame and cowpeas per hectare. This is quite significant as compared to the 6 to 4 bags of maize harvested per hectare in the area. The findings have shown that indeed drought resistant crops are an effective adaptation strategy to climate change as they have increased yields. Cowpeas and sesame have also been effective in ensuring households food access is increased and also has promoted high nutritional value in their diets. According to Wood (1998), a cup of cowpea is highly nutritious as it contains 11.1 g fiber, 13.22 g protein, 4.29 mg iron, 475 mg potassium,

0.91 g fat and 198 calorie. This is further supported by an interview carried out by the researcher with a health expert in the District who highlighted that sesame and cowpeas are highly nutritious and have been effective in promoting balance diets in the district among households.



Fig 2: showing stalks of sesame in ward 19 plot numbers 20

Furthermore, income levels have also increased as a result of high yields witnessed by the growing of sesame and cowpeas in ward 19. The researcher found out that farmers in the area have a market to sell their sesame and cowpeas. SIDELLA trading company is providing farmers in the area with a market for their drought resistant crops. The findings show that a kilogram of sesame was priced at 60 cents per kilogram and cowpeas at 40 cents per kilogram. For every

1000 kilogram of sesame, farmers would pocket \$600 and for every 1000 kilogram of cowpeas, farmers pocketed \$400. The researcher made comparison with maize pricing from the Grain Marketing Board, in the district and found out that the price offered per 1000 kilogram of maize was \$300. This ultimately shows that drought resistant crops fetch higher prices on the market and are indeed income generating. A farmer in the ward, on plot number 19 was quoted by the researcher saying,

I was able to harvest 1050 kilograms (21bags) of sesame as well as 900 kilograms (18 bags) of cowpeas which I have managed to sell to SIDEELLA at \$630 and \$360 respectively, from the one hectare of each crop that I grew which has been very profitable for me as I pocketed \$690 after deducting at a total cost of production of about \$300 for the two crops . I have been able to support my family and send my children to school.

The researcher noted that indeed drought tolerant crops are an effective adaptation strategy. Farmers in the ward continuously reiterated that they have been able to supplement their diets with the cowpeas, which is highly nutritious and they have also been able to sell surplus yields which has ultimately led to an increase in income levels for them.

However, a farmer who was interviewed in the area also revealed that they lacked support from the government and non-governmental organizations. The farmer revealed that agricultural

extension officers only started to express their interests in their growing of sesame and cowpeas later on when they had already planted the crops. Extension officers have a mandate to give advice to farmers concerning agriculture, but the respondent revealed that they had not been forthcoming in terms of deliberating issues on climate change and adaption.

Conservation Agriculture

Conservation agriculture is also another adaptation strategy that is being carried out in Chirumanzu District in order to cope with the effects of climate change. Conservation agriculture, according to Erenstein (2003) refers to a type of farming that seeks to achieve maximum yields, taking advantage of the natural resources but while protecting the environment and also making effective use of external inputs. All this is achieved by making sure that there is minimum tillage of the soil, in order to reduce erosion, effective crop management and conserving water.

In Chirumanzu District, the researcher observed and also noted through interviews that communities have resorted to conservation farming as a panacea to curbing the effects of climate change. Owing to the effects of climate change, communal farmers in the district were unable to harvest well, their crops were often affected by high temperatures. Through interviews, the researcher noted that the highest temperatures averaging 26°C, poor and sporadic rainfall of less than 250mm per annum. With the coming in of conservation farming, farmers were able to practice minimum tillage, conservation of water through digging holes where water for the crop is planted and also saving inputs like fertilizer by placing the fertilizer directly on the crop. This

has enabled farmers to engage in environmentally friendly farming practices but producing high yields at the same time.

In an interview carried out by the researcher with AGRITEX officers revealed that maize production had increased tremendously by 30% as compared to the previous years where in most cases householders were not food secure, they had limited access to food, though there have not been able to eliminate food insecurity totally, there is significant evidence that if communities are educated more on conservation farming, they can realize high yields as evidence shows that conservation agriculture is indeed working.

Furthermore, farmers in the district, who were interviewed by the researcher continuously, reiterated that conservation tillage produced high grade maize as compared to those practicing conventional farming methods. There was strong evidence that this was true as the researcher was able to see stocks of maize in the wards where conservation agriculture is being carried out. For example, where farmers used to harvest five bags of maize, there has been a slight increase of seven to eight bags as compared to previous years. This clearly putting to light the fact that conservation farming is an effective adaptation strategy in dealing with the effects of climate change in the district. Moreover, the researcher's findings were similar to those observed by Nzabi (2002), who noted that in Kenya, conservation farming produced higher yields of 2.6 t/hectare as compared to 1.8 t/hectare produced with conventional farming methods. More so, respondents from the district revealed that it was a cheap agricultural practice, which conserves the environment, hence making it an effective tool in promoting food security in the area.

Irrigation

The World Bank report quoted in Brazier (2015) states that there will be a decline in small streams in Chirumanzu district where average rainfall could decrease by between 12% and 16% by 2050. Irrigation systems in Chirumanzu District have also become a major avenue for coping with the effects of climate change. Irrigation schemes have been established in Hamamavhaire, Musena and Mbende. Irrigation has made it possible for communities in the area to carry out their agricultural activities which in turn would result in improvements in their diets. Chirumanzu mainly relies on rain fed water for agricultural purposes, with the drop of 5% rainfall per annum and excessive temperatures increases of 0.1 per decade (Brazier 2015), most crops were subject to these unfavorable conditions over the past years as a result of climate change, this in turn would affect yields as most crops would be affected by temperatures and rainfall conditions. UNFCCC quoted in the NCCRS (2015), indicates that areas for maize will decrease from the current 75% to 50% by 2080 under the worst case scenario. Only 3.5% of arable land in SADC is under irrigation, and in Zimbabwe this accounts to less than 200 000 hectares (NCCRS`, 2015)

In light of the above crisis, the community responded by engaging in a number of strategies that deal with the problems of water scarcity as a result of poor rains and excessive temperatures. The researcher through observations and interviews with AGRITEX officers in the district noted that the strategies that were employed to deal with this include improvements in water availability for agriculture through establishment of large scale irrigation schemes, rehabilitation of existing irrigation schemes and more centralized community gardens. The Musena irrigation scheme is one of the schemes that have been rehabilitated in the district. The interventions played a pivotal

role in increasing dry season agriculture productivity and availing water for domestic. The researcher through AGRITEX office records realized that the production of maize has increased from 3 tons per hectare to 5 tons per hectare which is a 40% increase; this has been attributed to water availability in the established schemes. These also reduce water scarcity for both agriculture and domestic use as people can access the precious resource at the irrigation schemes, rather than walking long distances.

Interviews conducted by the researcher showed that women and children would walk longer distances to access water for both agricultural activities and domestic use. With the sinking of at least 1 borehole per ward for every district, the burden on women has been lessened. The researcher found out that women can now concentrate on their horticulture activities without wasting more time on fetching water from unbearably long distances. UNICEF quoted in SustainZim (Issue 02/16) states that 65% of children from rural areas assist their families in fetching water. Children also spend more time studying as they don't have to be burdened by fetching water from long distances. The researcher also interviewed the Headmaster at Siyahokwe Primary school in Ward 16 and he alluded that attendance during dry season dwindles and an average drop of 30% from school can be noted as most pupils will be helping in fetching water for agriculture and domestic use. The headmaster also added that the rate of absenteeism and pupils being late for school has dropped since the sinking of boreholes in the ward and the one at the school notably a 95% attendance per week

Furthermore, horticultural activities in Chirumanzu district have enabled the community to supplement their diet and have surplus for sale. Irrigation schemes in Chirumanzu District supplies vegetables, tomatoes, butternuts, sweet potatoes, paprika, sugar beans, watermelons just to mention a few to nearby markets in Mvuma, Gweru and Masvingo. Watermelons have become an income generating project for communities in the district. The district is well known for its production of watermelons. This in turn has led to the generation of income and the creation of jobs especially among the youth. Through interviews with a number of farmers in the region, the researcher found out that watermelons are produced in the area and are sold for a dollar to \$2. Mostly youth are engaged in selling these, this in turn creates employment and a steady income from selling watermelons. Interviews with youths involved in the watermelon project showed that on average, one can pocket home approximately \$70 per month depending on the yield. This in turn has increased their food access and income levels, thereby contributing to sustainable livelihood.

An interview carried out in ward 14 revealed that irrigation has improved the lives of people in Chirumanzu District. The farmers interviewed in the area reiterated that they have been able to grow crops like peas, sugar beans and watermelons. This in turn has increased food availability at household level, communities are able to supplement their diets with surplus food from the harvests that they make from the irrigation canals. In terms of health, communities in Chirumanzu have been able to maintain their healthy diets, as improvements in irrigation entails that they can plant more and have surplus for consumption. The researchers finding were supported by FAO (1999), who revealed that there is a strong relation between irrigation and

health, as irrigation promotes the planting of various crops which in turn improves people's diets and their general wellbeing.

Furthermore, through interviews, the researcher also noted that irrigation in the area has also played a pivotal role in promoting youth participation. Participation by all groups of society is key in effectiveness of any adaptation strategy as strongly supported by Manyeruke (2012), who called for the active participation of all groups of society for effective adaptation to occur. The researcher also found this to be true, as participation by the youth in irrigation schemes has enabled them to increase crop production hence, they have also helped their families in maintaining sustainable livelihoods. The Munyati Irrigation scheme in Musena is Council owned, but the council has made it possible for all groups of people, especially the youth, to have access to the irrigation scheme. Youths interviewed in the area shared the same sentiments that the irrigation scheme has created an avenue for the creation of jobs for them. Through the selling of vegetables, they share the proceeds among group members and it was revealed that on average they get close to \$30 per month which is significant. They noted that had it not been for their economic emancipation as a result of the scheme, they would not have been able to support their families.

The establishment of irrigation schemes in the area has also promoted intensive community gardening as an adaptation strategy. Over the past years, communities in Chirumanzu District were unable to establish gardens owing to the unavailability of water sources in the area. This in turn would often affect their agricultural activities as in most cases their crops would be affected

by the harsh climatic conditions witnessed in the area. The researcher observed that the strategy has been effective in promoting the participation of women in Climate Adaptation in the area. Research has shown that women are the most affected by the impacts of climate change (Chikova et al 2013), hence community gardens have enabled women farmers to come together and form community gardens where they grow vegetables and other income generating crops which they sell on markets. This has ultimately led to the promotion of food access at household level, thereby contributing greatly to food security.

Organic Farming

Organic farming is also another strategy that has been implemented in Chirumanzu District in order to deal with the effects of climate change. Organic farming is a type of farming that avoids the use of pesticides, fertilizers and genetically modified seeds (Hicknel 2013). Organic farming seeks to use natural methods like manure, compost just to mention but a few for agricultural purposes. It is a type of farming that is environmentally friendly and reduces harm to the environment.

Through observation, the researcher noted that farmers in Chirumanzu have opted for organic farming as a means of increasing their maize productivity. Organic farming has enabled the farmers to maximize their yields and minimize costs at the same time. Through interviews with farmers in the district, the researcher noted that organic farming was more preferable as compared to conventional farming as it is cheap and maximizes profits. One farmer highlighted the fact that conventional farming practices require 300kgs of Ammonium Nitrate and 300kgs of

Compound D fertilizer per hectare. The researcher also found out that a bag of Ammonium Nitrate and Compound D fertilizer costs \$31 and \$28 respectively. In light of this, for a farmer to plant their maize with fertilizer, they require a total of \$354 for every hectare, whereas if they are to practice organic farming they incur no costs at all, as they use manure from cattle dung in the area and other organic material. Agricultural extension officers in the area, continued to reiterate that there has been a 20% increase in maize production as a result of farmers practicing organic farming. Thus organic farming has been an effective adaptation strategy as it has made sure that farmers do not incur costs of purchasing fertilizers but still maintain high yields.

Mixed Cropping

Interviews conducted in the region revealed that mixed cropping is also an adaptation mechanism that has been implemented in Chirumanzu. The district has been relying on rain fed agriculture for the production of maize, groundnuts and roundnuts which are the traditional crops in the area. However the harvest per tonnes has dropped to less than 30% in the past twenty years (Grain Marketing Board (GMB) report of 2015). This has been caused by reduced, sporadic rainfall of less than 250 mm as argued by Moyo (2012) which have ultimately led to serious food insecurity in the district. As an adaptation strategy employed to enhance food security as indicated by food shortages, improvement in mixed farming is an adaptation strategy employed in Chirumanzu where different crops are grown in one field, for instance maize and nitrogen fixing groundnuts to increase maize production. This has enabled communities to enhance their climate change resilience. It was also noted through interviews that before farmers adopted this mechanism, they would produce an average of six bags of maize which is insignificant in terms of promoting food security, as their plants were more susceptible to climate change. Mixed

farming has enabled them to spread risk in the event that one crop fails, they can harvest another. Thus mixed farming has emerged as an effective adaptation strategy.

Furthermore, apart from drought resistant crops, maize crop varieties like SEEDCO SC 403 which are fast maturing have also been introduced so as to counter the shorter rainfall periods. This has remarkably increased the maize production to 30% in Chirumanzu District and has reduced vulnerability at household level. The District Administration Officer interviewed said that, the maize yields in Chirumanzu has improved by 30% from 5 tons to 6.5 tons per hectare in the district and projected to grow if more drought resistant seed varieties are adopted. Through observation, the researcher noted that they are able to produce surplus, the little that they harvest is sustainable for consumption and little for sale. Thus from the findings, one can establish the fact that adaptation strategies in Chirumanzu are enhancing livelihoods thereby promoting a sustainable livelihood.

Small Livestock Rearing

Livestock has also been affected as a result of climate change in Chirumanzu District. An interview carried out with an AGRITEX Officer in the area revealed that more than 60% of the districts herd has been affected. Livestock provides draught power, meat and milk to supplement the diet of people in Chirumanzu District. The government through the ministry of agriculture and livestock production has embarked on improved livestock production. Cattle rearing in Chirumanzu has been the most dominant livestock activity but has also been on a decrease due to poor climatic conditions which have resulted in the recurrence of drought more particularly the

1992 and 2002 drought which killed notably more than 60% of the district herd cattle in the area as reported by the veterinary department. Veterinary report 2008 indicates that diseases like red water killed more than 60% of the cattle in the drought of 1992 and the district has not increased to reach its height since then.

In response to the above, the district embarked on a small livestock production as climate change adaptation strategy in a bid to cope with the effects of climate change on the environment. Households in Chirumanzu District are now rearing goats and sheep in the area in response to the effects of climate change. In an interview with an AGRITEX officer revealed that they had been encouraging farmers to shift to rearing small livestock as a coping strategy to climate change. The AGRITEX Officer also noted that the pastures that a single cow feeds on, 6 goats can feed on the same area. Henceforth, communities in Chirumanzu District have been encouraged to opt for small livestock, as they do not require as much grazing land as compared to cattle.

The researcher also observed that farmers in the District have embraced this adaptation strategy. At household level, the researcher noted that communities had more herds of goats than cattle as a response to climate change. The herds have provided communities with an avenue that promotes sustainable livelihoods. Thus the researcher was able to conclude that production of small livestock is an effective climate change adaptation mechanism.

Optimizing Breed Mix

Another adaptation strategy that has been implemented in Chirumanzu District is optimizing breed mix. This strategy is the process of cross breeding animals in order to have more resilient

and more productive livestock varieties. The strategy improves the breed of the animals and makes them resistant to diseases and parasites. Goat and sheep production have also been introduced in Chirumanzu District to increase meat production. In rural areas people are more hesitant to kill or sell cattle as it symbolizes wealth and bear family respect as compared to goats where people can kill and improve their dietary needs henceforth improving their sustainable livelihoods options. Goat mixed breeds have been introduced for drought and disease resistance in Chirumanzu area. In an interview with an AGRITEX officer in ward 19 revealed that a farmer in the ward on plot number 19 is cross breeding 1 Boer goat Ram with goats in the area. This in turn has improved the local breed of goats in the area. Goats are sold and money is used to supplement their diet and sending children to school. Thus optimizing breed mix has been an effective adaptation strategy in dealing with the effects of climate change in Chirumanzu District.

Greenhouses

The researcher, through interviews with farmers in the district noted that the farmers have adopted Green houses in order to deal with the impacts of climate change in Chirumanzu District. A farmer in ward 15 which is known as Mavise and ward 19 which is known as Musena, indicated that they have resorted to greenhouses as an adaptation mechanism for climate change. The farmers shared the same sentiments that green houses have helped the farmers to have diversified agricultural activities, which have enabled them to shift from traditional crops like maize, which are more susceptible to the impacts of climate change. Greenhouses have also enabled the farmers to grow crops all year round at a time when they cannot be grown outside.

In addition, the farmers also noted that before the construction of these in their areas, they used to face devastating challenges in maintaining their livelihoods as they could not harvest much when they planted maize in their fields owing to the erratic and sporadic rainfall witnessed as a result of climate change. The shift to the construction of greenhouses enables yield to increase as evidenced through an interview carried out between the researcher and a farmer in ward 19 who highlighted the fact that he has shifted to planting tomatoes in green house in order to increase yield. The farmer highlighted the fact that planting tomatoes in the open has often led to yields of less than 10kgs for each plant and also cost of production becomes higher. He went further to say that by planting tomatoes in green houses, for every 500 square meters of land, 1 500 plants are produced, each plant weighing 20kgs which adds to 30 000 and of that, in most cases they manage a yield of 80% selling at 40cents. The farmer reiterated that greenhouses indeed produced more yields as shown by the statistics that the farmer gave to the researcher. Another important factor that the farmer highlighted was the issue of saving water which characterizes the use of green houses. Green houses use drip irrigation which saves so much water as compared to planting tomatoes in the open.

Moreover, green houses have also provided jobs for youths in the area. From the interviews that were carried out in the two wards, the researcher noted that villagers welcomed and appreciated the move that was made by the farmers who implemented green houses as they have provided them with jobs and a diversified economic activities which have enabled them to earn extra cash for to take their children to school. Youths are involved in the planting and harvesting of

tomatoes in the greenhouses and have indeed benefited as they are paid for their services. Thus the researcher noted that green houses have been an effective adaptation strategy to the devastating effects of climate change in Chirumanzu District.

Indigenous knowledge system

Owing to the districts over dependence on rain fed agriculture, indigenous knowledge systems have emerged as an adaptation mechanism for rainfall prediction (weather forecasting). The researcher, through interviews, noted that farmers in the district continued to reiterate that indigenous knowledge systems provided a basis in predicting the coming season rainfall pattern. Mugabe et al (2010) defines Indigenous Knowledge Systems (IKS) as the traditional methods that have been developed by communities over years in dealing with the natural environment.

Farmers in Chirumanzu have managed to increase their harvests by simply predicting rainfall patterns in the area. One farmer interviewed highlighted the fact that they use trees, bird movements, and animal species in the area to forecast how weather patterns will be for the coming season. The respondent in ward 19 went on to give an example of the “Mutsambatsi” tree where he said that if the trees flowers bloom and they do not fall off, it would mean that they would have a bumper harvest for the coming season and if they do not bloom at all this would mean that there would not be rains in the coming season.

Furthermore, farmers in Chirumanzu have highlighted that Indigenous Knowledge system as a coping strategy has enabled them to make effective crop management decisions. Through interviews with farmers the researcher noted that farmers in the district are very much able to

manage their crops effectively as through (IKS), they have been able to know when to plant their crops, the type of crops to use, and type of tillage this has resulted in high yields as the combination of Indigenous Knowledge Systems and rainfall predictions from the metrology department has enabled them to harvest and manage their crops. One farmer in ward 19 highlighted the fact that they are able to predict late rains with the help of IKS coupled with metrology department weather forecasts, and have in most cases opted to plant stagger their plants which resulted in a harvest of 12 tonnes of maize this last season.



Fig 3: showing 12 tonnes of maize harvested by a farmer in ward 19

Moreover, most respondents revealed that IKS has been effective in helping them maintain food security in the area and is the most preferred as it is not expensive, allows community participation and is sustainable as compared to other mechanisms. The findings that the researcher made concur with Robinson and Herbert (2001), who argue that IKS leads to effective

adaptation and is cost effective and participatory, thus making it more effective as an adaptation strategy to climate change adaptation in the area.

Natural resource management

Natural resource management is another adaptation strategy that is being carried out in Chirumanzu District. Through observation, the researcher noted that, the management of wetlands in the area has played a pivotal role in reducing climate vulnerability in Chirumanzu area. Protection of natural resources such as wetlands and mountain ecosystems has resulted in improvements in life styles for the people in Chirumanzu. Ecosystems provide fresh water for domestic use and animals while mountains are good grazing lands and provide wood for energy. Thus the adaptation strategy has been effective in ensuring that the communities maintain their livelihoods though the researcher noted that the communities lack knowledge on the importance of wetlands and natural resources as there is over deforestation of trees in the area.

Off Farm Activities

‘Fushai’ is an off farm activity that is also being implemented in Chirumanzu District as a climate change coping strategy. ‘Fushai’ is an off farming activity which women are engaging in as a means to diversify their economic activity and earn extra income which is needed to supplement their diets, send their children to school and for sustaining their livelihood.

The FGD carried out by the researcher revealed that women are able to save money and in case they experience droughts as a result of climate change they have somewhere to fall back on. 'Fushai' is a project that enables women to save money, they join the project by paying a joining fee of \$5 USD, each month a member is entitled to borrow money and when they return the money it attracts a certain percentage of interest. This in turn has encouraged saving and has also enabled the participation of women in climate change issues. It was also noted that before the implementation of this project in the area, women used to suffer the disastrous effects of climate change as they would not have anywhere else to fall back on when droughts occur. Women are now able to supplement their household's diets and maintain their livelihoods as a result of the project.

However, communities also had mixed feelings concerning 'Fushai' as an effective Climate Change Adaptation Strategy. The research revealed that, from the FDG conducted in ward 12, women highlighted the fact that in most cases they are unable to join the group, as cash still remains a major setback for communal dwellers. Respondents continuously reiterated that the project is creating classes in the communities where only the rich can participate effectively in Climate change issues. Thus Fushai has its major drawbacks, which further raises questions concerning its effectiveness as an adaptation strategy.

Nature conservation as an alternative source of livelihood

Chirumanzu community has engaged in nature conservation activities as a way to reduce climate change vulnerability. This has been successful through projects such as bee keeping. The

climatic conditions of dry winters promote bee activity therefore high honey production. In ward 9 for example, communities have actively participated in bee keeping as an alternative source of livelihood. Natural honey with its medical characteristics has high market share locally in Chirumanzu and in nearby urban centers. This has resulted in additional income to the rural populace of Chirumanzu. Thus this contributes to a sustainable livelihood, thereby making the adaptation strategy effective.

‘Mushandirapamwe’

The researcher also observed that in Ward 12, communities have adopted the ‘Mushandirapamwe’ strategy as adaptation to climate change in the area. ‘Mushandirapamwe’ involves women actively working together in agricultural activities. In this strategy, women grow vegetables, maize, sugar beans just to mention but a few as a team. When the harvest their crops, they sell them and share the proceeds among themselves. This alone has empowered women as they have a source of income. The dominant crop grown is vegetables, which they produce and sell for a dollar per bundle. The researcher observed that this has in turn improved food access.

Chapter Summary

The chapter mainly focused on the researchers findings concerning adaptation strategies in Chirumanzu District. The researcher found out that the main adaptation strategies being implemented in Chirumanzu District are communal based adaptation which include growing drought resistant crops, irrigation conservation farming just to mention but a few, all these

contribute greatly in supporting the livelihoods of people living in Chirumanzu District. The researcher also found out that adaptation strategies have been participatory in nature, as all groups of people in the district are actively involved responding to climate change through the adaptation mechanisms and have been effective too. Hither to this, the researcher found out that though in some cases there have been drawbacks in implementation of strategies like ‘Fushai’ and even growing of drought tolerant crops, where farmers have shown lack of technical knowledge and support from the government, the adaptation strategies in Chirumanzu are indeed viable.

CHAPTER THREE

TOWARDS EFFECTIVE CLIMATE CHANGE PROGRAMMING IN CHIRUMANZU

DISTRICT

Introduction

The chapter will look at recommendations that can be made in order to deal with the effects of climate change in Zimbabwe. Climate change as a phenomenon cannot be tackled by Chirumanzu District alone, but it requires various actors in order to deal with the effects of climate change in the District. The government, private sector and Chirumanzu District need to work together and actively participate in reducing climate vulnerability in the district and promote resilience and adaptability in tackling with this impending disaster. Climate Change is real, and needs serious attention if the country is to achieve any meaningful development. Thus this chapter is set to give suggestions for effective climate change programming in Chirumanzu District.

The researcher noted that it is almost a year now since the climate change response strategy has been in launched but it still remains a document. Implementation of the strategy at grass root level is still nonexistent. Communities in Chirumanzu are not aware of this document hence making any meaningful sustainable climate change programming very difficult in the area. Climate change experts have continuously reiterated that for any meaningful and effective climate change programming to take place, there is great need to incorporate communities at grassroots levels. The fact that the strategy has failed to reach grassroots, simply entails that implementing resilience and adaptation in the area will be very difficult. Thus, it becomes

important for the government to disseminate information concerning the adaptation strategy, so that communities become aware of their roles in dealing with climate change. This in turn would ultimately lead to effective climate change programming in the area.

Furthermore, the researcher noted that there is lack of extension services in the area that is educating people about climate change. A respondent interviewed noted that there has not been support from the government in terms of climate change adaptation in the area and general information concerning climate change and agriculture. It was revealed that extension officers working in the area only expressed interest later in what farmers were doing to curb the effects of climate change. The lack of support from the government makes it impossible for the adaptation strategies to be effective in the area. The researcher would suggest that the government engages extension officers in Chirumanzu to help farmers in dealing with the effects of climate change as this has been a major drawback towards effective climate change programming in the district.

Moreover, there is also need for the government to create synergies with the private sector, non-governmental organizations and the private sector in order to deal with climate change. The researcher is fully aware that the government cannot work alone in dealing with climate change hence it needs to create links with nongovernmental organizations, who can penetrate at grassroots level. During the research, a respondent highlighted the fact that there is not much work being done by the NGOs in climate change in the area. Hence if the government creates synergies, this will enable effective climate change programming in the area.

The researcher also noted that nongovernmental organizations in the area are not doing much in terms of promoting resilience, adaptation and mitigation of the effects of climate change. Non-Governmental organizations in Chirumanzu District are promoting dependency. The researcher noted that they haven't been doing much to empower communities in Chirumanzu District. One respondent highlighted the fact that they only see these NGOs in food distributions and not in capacitating them with ways in dealing with climate change. The researcher is suggesting that NGOs move away from creating a dependency syndrome and emancipate communities on adaptation measures that they have to take in dealing with climate change.

Climate change programming requires funding, transparency and accountability. The researcher would suggest that funds be availed and a revolving fund for climate change be established in the country. This will ensure that funds are availed in areas where they are needed, especially in Chirumanzu District as funding is the major drawback in climate change programming. Farmers in the district are unable to actively participate in climate change mitigation, resilience and adaptation owing to the fact that large sums of money are required. For example, the area has not been able to actively participate in rain water harvesting which is an adaptation strategy that is could not be effectively pursued owing to lack of funding.

Furthermore, the researcher also recommends that climate change be taken up by people and policies that matter the most. In Zimbabwe for example, climate change is being taken up by the Ministry of Environment Water and Climate Change, the Ministries are relatively weak and do not receive as much funds as compared to other ministries, this in turn affects implementation of

policies and strategies at grassroots level as witnessed in Chirumanzu District. In Rwanda, for example, the strong support by President Paul Kagame's for national action on climate change, alongside involvement from relevant ministries, led to climate change being at the heart of the country's development planning processes. In light of this, if the government of Zimbabwe is to adopt this, this in turn could make climate change programming effective in the country, including communal areas like Chirumanzu District.

The researcher also recommends that the government factors in climate change future investment planning if considerable programming is to be achieved in Chirumanzu. Projections made by the International Panel for Climate Change (IPCC) (2014), predicts that by the end of the century the average global temperature is very likely to have risen by 2°C. Rainfall is likely to decrease in Southern Europe, Asia and Sub Saharan Africa. This entails that Zimbabwe, which is housed in the Southern Africa will be affected and also Chirumanzu. The government needs to plan effectively in investing in scientific materials for monitoring weather patterns and infrastructure that promotes resilience, adaptation and general response to climate change. This in turn will promote effective climate change programing in Chirumanzu District.

The researcher also suggests that non-governmental organizations play an active role in promoting climate change response action in communal areas. Non-governmental organizations should shift from short funding of climate change programs and donor driven projects and move to long term planning that promote climate change adaptation and resilience in communal areas. This in turn will contribute to effective climate change in Chirumanzu District. Communities are

also recommended to actively participate in climate change issues as they are the ones that are most affected by climate change since they mainly rely on the natural environment for survival.

Chapter Summary

The chapter looked at the measures that have to be taken into consideration in order to effectively promote climate action in Chirumanzu District. The chapter also revealed that for any meaningful climate programming to take place in Chirumanzu District, there is need for various actors to work together for the sustainability of adaptation strategies in Chirumanzu District.

CONCLUSION TO THE STUDY

The research concludes that adaptation strategies are effective in dealing with the effects of climate change in Chirumanzu District. The researcher also managed to highlight the major drawbacks in climate change adaptation in the area, the major drawbacks being funding, lack of government support and lack of knowledge and information dissemination in the area. The research also noted that adaptation strategies in Chirumanzu are mainly as a result of communities finding ways in responding to an impending disaster as the research has shown that they are lacking full government and non-governmental support. Communal farmers are just devising ways in dealing with a potential crisis as information about adaptation has not really been disseminated to them by the relevant authorities. The research was mainly focused on understanding the effectiveness of climate change adaptation strategies in Chirumanzu District in relation to the sustainable livelihood approach. The researcher found out that indeed the adaptation strategies were promoting sustainable livelihoods as communities in Chirumanzu are able to have access to food, though they are not being able to produce surplus at times, the researcher found the fact that they could sustain their livelihoods sustainable.

The researcher used the case study research design, which sought to assess climate change adaptation in Chirumanzu District where the researcher saw this befitting as she realized a gap in literature, where there is not much research on adaptation in Chirumanzu. The researcher was also cognizant of the fact that climate change does not require a one size fits all approach. Focusing on Chirumanzu District would in turn limit the one size fits all approach in dealing with climate change as it is not viable owing to the fact that communities experience climate issues differently hence the researcher sought to establish this in the study. The qualitative

research approach was the most appropriate to the researcher, as qualitative research provides clear understanding of issues under study. The data collecting tools that the researcher used were interviews, focus group discussions, observation and secondary sources. These data collecting tools gave the researcher a clear picture of climate change in Chirumanzu District. The data was analyzed using the Sustainable Livelihood Approach, where the success of each strategy was measured by the framework.

The researcher employed the crisis decision theory as a basis for their study. In so doing, the researcher sought to support the theory which seeks to explain how people respond to a crisis. The theory provided a basis for proving that the research carried out by the researcher is grounded under the crisis decision theory. The theory best explained how communities in Chirumanzu have responded to climate change. The research was further conceptualized through the sustainable livelihood approach. The sustainable livelihood approach provided the researcher with the best framework in measuring the adaptation strategies being implemented in Chirumanzu District. The researcher sought to find out whether strategies being implemented in Chirumanzu support sustainable livelihoods, that is, the promotion of food security, energy access, and water availability as was highlighted in the study. The researcher concluded that indeed adaptation strategies being implemented in Chirumanzu have indeed supported sustainable livelihoods.

Furthermore, the research also looked at what climate change experts say about climate change adaptation. The literature review, revealed that adaptation is indeed possible and is sustainable if communities involved are encompassed in the decision making process of issues of climate

change affecting them. The literature review also looked at the importance of Indigenous Knowledge Systems in adapting to climate change. The study also sought to look at the challenges affecting adaptation, which included poor information dissemination and scientific knowledge in Sub Saharan Africa.

The study also sought to look at the evidence of climate change in Chirumanzu District. The study first gave an overall outlook on climate change in Zimbabwe as a whole. In which the researcher proved beyond reasonable doubt that indeed climate change is being experienced in Zimbabwe owing to the changing rainfall patterns, unbearable temperature changes and sporadic rainfall. Chirumanzu is not spared at all from these weather patterns, as the study also showed that Chirumanzu is also experiencing climate change.

The study also sought to look at adaptation strategies in Chirumanzu District. The study showed that conservation agriculture, mixed farming, growing drought resistant crops, Indigenous Knowledge systems and diversified economic activities are the major strategies being implemented in Chirumanzu District. The study clearly showed that adaptation strategies in Chirumanzu District were indeed effective in dealing with climate change in the area and also in the promotion of sustainable livelihoods. The researcher also looked at the level of participation of each and every group in Chirumanzu District, in which the researcher found out that adaptation strategies were incorporating the vulnerable groups in the community like women who now have diversified their economic base by taking active roles in projects like ‘Fushai’ which have been highlighted in the study. The youth have also been incorporated as they run their irrigation projects too.

Lastly, the study also sought to give suggestions towards effective climate change programming in Chirumanzu District. The researcher noted that policies and strategies in relation to climate change were not known in Chirumanzu District, for example the climate change response strategy was launched for almost a year now, but the strategy has not penetrated grassroots levels like Chirumanzu District hence making any meaningful sustainable programming difficult. The study also sought to highlight the importance of each and every actor in Climate change programming and the study clearly showed that role of the government, nongovernmental organizations and Chirumanzu District.

The study depicts the fact that indeed climate change adaptation strategy are effective in solving food security issues that have been bedeviling the country. The study clearly established the fact that adaptation strategies in Chirumanzu District promote sustainable livelihoods. Though there have been drawbacks here and there in terms of issues like funding and support from the government, Climate Change Adaptation Strategies have been effective in Chirumanzu District.

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APPENDIX

INTERVIEW GUIDE FOR ASSESSMENT OF CLIMATE CHANGE ADAPTATION STRATEGIES FOR CHIRUMANZU DISTRICT

My name is Cynthia Rutendo Gota and I am a student at the Midlands State University. I am carrying out a research entitled: An assessment of climate change adaptation strategies for Chirumanzu District. The research that I am carrying out is strictly academic and is intended to meet the requirements of the partial fulfilment of the Bachelor of Arts in Development Studies Honours Degree. I am kindly asking your assistance and cooperation in answering the following interview questions.

Interview and Focus Group Discussion Guide Questions

1. What have been the major impacts of climate change in your area?
2. How has climate change affected your livelihoods
3. What adaptation strategies are being carried out in your wards?
4. Have the adaptation strategies improved your living standards i.e. access to water, food security, fuel and incomes.
5. What major challenges have you faced in implementing adaptation strategies in your area?
6. What form of support has been rendered to you by government, agricultural authorities and in adapting to climate change

7. How best can the government, non-governmental organizations, private sector and agricultural authorities help in promoting adaptation in your district.
8. What recommendations would you give towards effective climate change adaptation in your district?

Interview Questions for Key Informants

1. Designation of the respondent?
2. How has climate change affected Chirumanzu District as a whole?
3. What is the current statistics in terms of rainfall patterns, temperatures, livestock production and crop production in your area?
4. What measures have you put in place in helping communities adapt to climate change?
5. What recommendations would you give to the government to actively promote adaptation strategies in Chirumanzu District?