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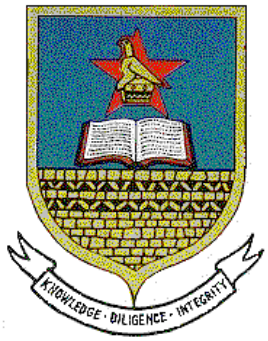

RURAL LIVELIHOODS VULNERABILITY AND ADAPTATION STRATEGIES IN THE FACE OF CLIMATE CHANGE. A CASE OF MUTOKO DISTICT CHIWORE WARD 16A, MASHONALAND EAST.

BY

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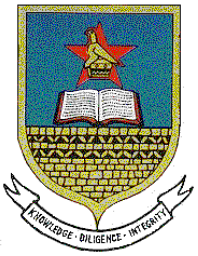

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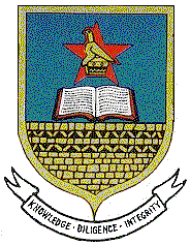

APPROVAL FORM

The undersigned certify that they have read and recommended to the University of Zimbabwe for acceptance, a research entitled "Rural **livelihoods vulnerability and adaptation strategies in the face of climate change. A case of Mutoko East District Chiwore Ward 16A, Mashonaland East."** Submitted by Wendy Loveness Chipara in partial fulfillment of the requirements for the Master of Science Degree in Sociology and Social Anthropology

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Supervisor

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Project coordinator

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External examiner

Date……..

DECLARATION

This is to certify that this dissertation entitled, Rural livelihoods vulnerability and adaptation strategies in the face of climate change, A case of Mutoko East District Ward 16A, Mashonaland East as a fulfillment of Master of Sociology and Social Anthropology Complies with the University of Zimbabwe Regulations and meet the accepted standards of originality and quality.

Signature……. Date…….

Supervisor

Signature…… Date……

Dedication

This dissertation is dedicated to my loving and supporting parents, my three brothers ; Floyd ,Hope and Obey and to my best friend Billy Kalima

Abstract

Rural households have been grappling with various challenges due to developmental strategies which are skewed towards urban areas in most developing countries. Climate change has emerged as one of the major challenges with regards to rural livelihoods strategies which are heavily reliant on the natural environment. A number of studies have been carried out on climate change variability and its effects on rural livelihood strategies. In these studies rural households have been portrayed as people with limited capacity, who can only adapt to climate change variability by relying on some form of external interventions such as the government and the NGOs. The study found out that rural livelihoods in particular Traditional Agricultural Livelihoods strategies are more vulnerable to climate change. However, livelihood diversification has been adopted by the rural households, with households utilizing the various forms of capital and the agencies to adapt to climate change. Partnerships have been formed, initiatives in irrigation equipment have been noted which are not only effective and efficient but are also affordable. A shift from large livestock production to small livestock production was also noted due to the relative advantage that small livestock have as compared to large livestock. The study also concluded that adaptation strategies which are being employed by the rural households are not only for a short term basis but are also not sustainable. There is need for a collective effort from the various stakeholders to come up with sustainable adaptation strategies and effective ways of combating climate change.

List of Acronyms

AGRITEX	Agriculture Extension Officer
CADS	Cluster Agricultural Development
COMMUTECH	Community Technology Development Trust
EMA	Environmental Management Agency
NGO	Non-governmental Organisation
UMCO	United Methodist Committee on Relief

Acknowledgements

I wish to acknowledge the assistance received from the people mentioned below who made it possible for the research to be a success.

My Family Mr and Mrs Chipara and my three brothers Floyd, Hope and Obey who encouraged me and gave me the reason to continue with the research despite facing a lot of challenges, words alone cannot fully describe what you did for me. I would also like to thank my uncles and aunts especially Uncle Blazio who had had to go out of his way accompanying me all the time during the field work.

Many thanks go to my supervisor Dr Musevenzi for his patience, guidance and constructive criticism which enabled me to come up with a comprehensive research. Despite his busy schedule, he always found time to offer me guidance during the carrying out of the research.

The study would not have been what it is without the unwavering support and assistance from friends like Billy Kalima who provided both emotional and technical support, Benjamin Taruvinga, Rumbidzai Nyazondo and Ordet Kamzonde who were travel companions. Their warm support went a long way in motivating me and endure and overcome the challenges that I went through.

I would also like to thank the Lord Almighty for sailing me through despite trials and tribulations in the carrying out the research. To all I want to say most sincerely **THANK YOU!**

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Chapter 1: Introduction

1.0 Introduction

The study focuses on rural livelihoods vulnerabilities and adaptation strategies in the face of climate change. The study was carried out in Chiwore Ward 16A Mutoko East District, Mashonaland East. The objectives of the study were to identify the effects of climate change on livelihoods strategies for the households of Chiwore, identify adaption strategies which are being employed people in Chiwore Ward 16A and to ascertain whether the adaptation strategies are sustainable or not in the face of the ever changing climate. The qualitative research methodology was employed in the study with the descriptive method being the research design utilized.

The Sustainable Livelihoods Approach was utilized in the study in an effort to show how the rural livelihoods have come under stress due to climate change. The reason why the researcher has chosen the Sustainable Livelihoods Approach to explain the adaptation strategies which are being employed by the inhabitants of ward 16A is that it is an area which is characterized by agro economic activities as the major livelihood strategy. Despite the fact that Chiwore Ward 16A is in ecological region four, households rely mainly on market gardening with no major source of water other than deep wells. Deforestation is highly visible in the area contributing immensely to climate change. The study is going to contribute immensely to the body of knowledge in the sense that climate change affecting everyone people will benefit from the adaptation strategies which are being employed by households in Chiwore Ward 16A in response to climate change.

1.1 Background of the study

Climate change has caused a lot of problems globally. There has been consistent droughts, increase in temperatures (heat waves) inconsistent rainfalls, and an increase in livestock diseases among others. Chiwore Ward 16A whose major livelihood activities are agro based has not been spared the brutality and vulnerability of climate change. Livestock production has been greatly affected with livestock perishing in large numbers due to diseases which are emanating from the changes in temperatures. With erratic rainfall and dry spells agricultural produce has dwindled significantly and as such the livelihood activities of the people in Chiwore Ward 16Awhich are sorely depended on the natural environment have been severely affected by climate change. As such the researcher has been prompted to conduct a research on how the rural livelihoods have become vulnerable to

climate change, identify the adaptation strategies which are being employed by the households in Chiwore Ward 16A and ascertain whether the adaptation strategies are sustainable or not given the continued threat of climate change.

1.2 Statement of the problem

Despite the fact that various institutions have worked in cohorts in an effort to combat the negative impacts of climate change, the problem has been seen to be on the increase. Climate change has been seen to be continuously posing a major threat to rural livelihoods strategies resulting in the entrenchment of rural households into high levels of poverty.

1.3 Research objectives

The main objectives of the study are to

1. Identify the effects of climate change on livelihood strategies in Chiwore Ward 16A.
2. Identify adaptation strategies which are being employed by the inhabitants of Chiwore Ward 16A.
3. Ascertain whether the adaptation strategies are sustainable or not in the face of climate change.

1.4 Significance of the study

Many scholars have carried out studies on climate change particularly on the causes of climate change, the impacts of climate change on food security and the effects of climate change on agricultural activities as well as livestock production among others. However the researcher noted with great concern that in as much as various studies have been carried out on the impacts of climate change on livelihoods activities particularly agriculture, very few studies have been done on the vulnerability and adaptation and strategies on the livelihood strategies among the lowveld regions particularly in Chiwore Ward 16A, the assumption being that livelihood strategies being employed by households in lowveld regions are not affected by climate change since they are accustomed to dry weather conditions. The researcher assumes since Chiwore Ward 16A is in the agro ecological region four, impacts of climate change are of insignificant value which is not the case. In fact climate change is being felt by households of Chiwore Ward 16A and as such the researcher was prompted to carry out the study in attempt to fill the knowledge gap which currently exists.

1.5 Study area

The study was conducted in Mutoko East District, Chiwore Ward 16A in Mashonaland East on the Eastern side of the country. The district was chosen because of its ecological region which is region IV. The district is composed of eight wards but for purposes of the research the study focused on Ward 16A only. The people in Mutoko East District heavily rely on agricultural activities for their livelihoods strategies with the main livelihood strategy being market gardening. In as much as they depend on agricultural activities water is a scarce commodity since the inhabitants of ward 16A depend on deep wells for and shallow dams for water which have been drying up due to excessive temperatures and erratic rainfall patterns. The boreholes which are in the area were not only far from the reach of many but are also nonfunctional. Vegetation in the area was poor and as such there was very little evidence of livestock production. However due to climate change the area had been under serious threat from droughts and as such the livelihoods activities which were agriculturally based had come under enormous stress driving the local villagers into poverty circles. In support of this Simba et al(2012) cited by Bhatasara and Mandizadza (2014) show that, reports from the Zimbabwe Meteorological Services Department indicate that temperatures over Zimbabwe have risen up to 0.8 from 1933 to 1983 which translates to 0.1 degrees Celsius per decade and Mutoko East district has not been spared from the increases in temperatures. In as much as the rural people are aware of the changes in the climate there is very little evidence of adaptation strategies being employed by the rural households.

1.5 Study limitations

Financial constrain is the major limitation which is likely to be faced by the researcher. Other limitations include the time factor since the researcher is employed as a result there is going to be a limit in the number of respondents to be selected for the research.

Chapter 2: Literature review

2.0 Introduction

The chapter looks at the literature review. Various sources of literature are going to be reviewed in relation to climate change and the livelihood strategies of the rural inhabitants. The terms climate change and livelihoods are going to be explored in the reviewing of the literature. Issues such as livelihoods diversification, livelihoods vulnerability and climate change, livelihoods strategies, adaptation strategies and adaptive capacity to climate change as well as the perceptions of rural dwellers to climate change are also going to be looked at. Studies from local, regional and international levels on climate change are going to be explored.

2.2 Understanding climate change

According to UN (1992) climate change means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. On the same wave length Akudugu and Alhassan (2013) point out that climate change may be defined as the gradual change in weather patterns of the world over a long period of time mainly as a result of human activities with respect to the environment. From the above definitions climate change can be defined as a change in the weather patterns from extremely hot to extremely cold which has been necessitated by human activities on the natural environment. In other words environmental degradation by humans has resulted in these extreme changes in temperatures.

Climate change is arguably the most persistent threat to global environmental stability (Egyir et al 2015). This is supported by Chikodzi et al (2012) who argue that, climate change has become a threat to rain fed agriculture and yet rain fed agriculture is an important economic activity in the developing world and in this case the rural areas. On the same wave length, Lacombe et al (2012) and Owusu and Waylen (2012) point out that, communities in the transition and coastal savannah zones are experiencing climatic changes with both the major and minor rainy seasons and the length of the growing season decreasing, resulting in reduced ability of famers to crop more than once in most places. In this case the study will be carried out in the inland and semi-arid area in Zimbabwe.

Rural areas whose main source of livelihood is rain fed agriculture has come under enormous threat from climate change. This is supported by WRI (1996) which points out that livelihood

activities which are based on agriculture that is mostly subsistence in nature; with a high dependence on rainfall irrigation is highly vulnerable to changes in climate variability, seasonal shifts, and precipitation patterns. The situation has been exacerbated by lack of knowledge by rural dwellers on the climate change. Through lack of knowledge on climate change farmers have continued to fall prey to climate change vulnerability and at times fail to come up with sustainable adaptation strategies to combat climate change. Despite the changes in climate which have been argued to be a major threat to rain fed agriculture households in Chiwore Ward have been seen to be continuing with the traditional agricultural livelihoods strategies with market gardening topping the list of the livelihoods strategies. This then means that the effects of climate change might be over exaggerated as households are surviving on the traditional livelihoods strategies.

According to FAOSTAT, (2005) cited by Chikodzi et al (2012) globally rain fed agriculture is practiced in 80% of the total physical agricultural area and generates 62% of the world's staple food. This is further supported by Owusu and Waylen (2012) who point out that the over dependence of agricultural households in rural areas on nature means that such households are more likely to bear the impacts of climate change through changes in natural resources availability, ecosystems, water cycles and, food systems and the need to cope with a changing regime of weather pattern. In as much as rural households depend on agricultural based livelihoods they are endowed with agencies which allow them to diversify their livelihoods strategies. The livelihood strategies for rural areas are not entirely agro based and as such the livelihoods strategies might not be as vulnerable as has been protracted in various forms of literature. This means that livelihood diversification is practiced by the rural households depending on assets they are endowed with.

2.3 Defining livelihoods strategies

According to Ellis (2000) livelihood strategies are composed of activities that generate the means of household survival and are planned activities that men and women undertake to build their livelihoods. On the same wave length Eneyew and Bekele (2010) define livelihood strategies as the range and combination of activities and choices that people make in order to achieve their livelihood goals, including productive activities, investment strategies, reproductive choices etcetera. In addition Scoones (1998:7) shows that livelihood strategies are determined by the availability of resources, in terms of access to and control over these resources as determined by institutional frameworks. This is in line with UNDP (2005) which points out, how people access

and use their assets within the social, economic and political environmental context form a livelihood strategy. In addition Scoones (1998:11) points out that "rural livelihood strategies are often heavily reliant on the natural resource base" and it is the natural resource base which is bearing the brunt of climate change. In further support of this, Yohe and Tol (2002:403) note that because climate change is only one stress on livelihoods, the impact of seasonal forecasts requires assessing not just agricultural activities that might change in response to forecasts, but the multiple dimensions of rural livelihoods that constrain the uptake of information, have secondary effects and determine the system's ability to handle future stress.

The inhabitants of Chiwore Ward 16A engage in a variety of livelihood strategies and activities prominent among which are small scale agriculture, market gardening and poultry production the majority are heavily reliant on the natural resource base and are severely affected by changes in the climate.

2.4 Impacts of climate change on rural livelihood strategies

According to Ziervogel and Calder (2003) rural livelihoods are subject to multiple shocks and stresses that can increase household vulnerability amongst which is climate variability which is pervasive stress that individuals and communities in rural areas have to cope with. On the same wave length Tanner et al (2015) point out that climate change influences human development through its support or destabilization of the livelihood systems of the poorest and most vulnerable people. This is in line with Gukurume (2014) who says the general rise in temperatures has had various effects on the weather and has caused untold suffering to rural people's livelihoods. In line with this assertion New et al (2006) points out that there are glaring indications of total precipitation showing a gradual slide to drier seasons due to climate change. In further elaboration Dube and Phiri (2013) in their study of Matopos observed that that the declining precipitation and rising temperatures were making farming increasingly difficult thereby increasing food insecurity. In Mazviwa, Zvishavane Midlands Province small holder farmers pointed out that rainfall patterns have become extremely unpredictable in the recent years to such an extent that they could no longer predict the onset of rainfall for planting purposes. In addition Gwimbi (2009) notes that in Gokwe cotton production, maize production and the other small grains have been on the decline primarily due to climate change. In as much as there has been a decline in crop production in some areas others still argue that climate change does not exist. Instead they have maintained that nothing has changed in terms of their crop production. This is supported by Chikodzi et al (2012)

who point out that climate change vulnerability varies from one community or group of people to another depending on asset base they possess. Despite the challenges mentioned above agriculture remains the major livelihood strategy for the rural households. The question still remains on whether the rural households are continuing with agriculture as the major livelihood strategy because they don't have any other choice or they are engaging in other livelihood strategies.

FAO (1999) identified some of the impacts of climate change on agriculture which is the major source of livelihood for the rural folks. These are reduction in soil fertility, decreased livestock productivity due to higher temperatures as well as through the availability of feed and fodder, increased incidence of pest attack, resulting from increase in temperature, the manifestation of vector and vector borne disease and negative impacts on human resource availability. Adding on to this Gukurume (2014) in his study of Bikita pointed out that the dry spells during the rainy seasons have become frequent over the years. Adding on to this Chikodzi et al (2012) climate change has altered the rainfall patterns, amplified drought cycles, and increased the frequency of severe weather conditions and increases agricultural pests and diseases.

Brown et al (2012) in their study in their Study of Shurugwi Midlands Province discovered the negative effects of Cyclone Japhet which had occurred ten years ago were still being felt in Chirume community. Heavy rains during the cyclone had destroyed the community dam which was the central source of water for the communal garden which was a major livelihood strategy. In this regard people of Chiwore Ward 16A rely heavily on agriculture as a livelihood activity climate change has not spared the region either. On the same wave length Jones and Thorton (2003) observed that aggregate yields of maize in smallholder rain fed systems in Africa and Latin Africa are likely to show a decrease of about ten percent by the year 2055. Thus there has been a reduction in the agricultural produce as well as a reduction in the livestock production due to the increase in the exacerbation of vector borne disease. There is need for rural households to diversify their livelihoods taking into cognisance the livelihoods strategies which are not entirely reliant on the natural environment

Poor rains and persistent heat waves have resulted in the wilting of grown crops and poor germination of planted seeds (Gukurume, 2014). Owusu and Waylen (2012) observed that rainfall in Ejura and Wenchi Ghana has seen a reduction in both the major and minor rainy seasons and an in filling during the short spell resulting in a high risk of crop failure during the minor rainy season

as the onset of the rain delays and early termination occurs. In the study of the marine resources and inland communities Acquah and Onumah (2011) observed that in Dunkwa Ghana farmers perceived climate change as persistent drought and used a mixture of crop varieties to cope with the challenge. There are still misconceptions within the majority of the rural population about what climate change is. Rural people still have hope that rainfall patterns are going to improve for the better and as such may fail to come up with any adaptation strategies. Thus depending on agricultural activities only as a livelihood activity will lead to people in Chiwore Ward 16A living in abject poverty and as such there is need for them to devise a variety of adaptation strategies which are not sorely dependent on the natural resource base in order to deal with climate change.

2.5 Rural inhabitants and their adaptive capacity to climate change

According to FAO (2008) adaptive capacity refers to the ability of a human system to adjust to climate change (including climate variability and extremes), to moderate potential damages, to take advantage of opportunities, or to cope with the consequences. Various factors have a role to play in terms of the adaptive capacity to climate change. These include, gender and the social status. This is in line with Chikodzi et al (2012) who points out that the adaptive capacity of a community is assumed to be a function of wealth, technology, available infrastructure, institutions and natural resources. In further support of this Egyir et al (2015) observes that, access, status and ability are key factors in adaptive capacity. On the same wave length, Hari et al (2010:11) points out that "temporal properties such as frequency, magnitude, duration, and suddenness of extreme climatic events, which constitutes external side of vulnerabilities significantly influence adaptive capacity of individual or household." The ability of the rural household to cope with the climate change vulnerability depends on their assert base.

With very little or no assets adapting to climate change is not possible. Therefore there is need for rural households to realize their individual incapability to cope with climate change as individuals and form partnerships if need be. Marginal groups which include those with few resources, no accesses to power especially women are more vulnerable to climate change and therefore are unable to adapt to the atrocities of climate change.

Eakin (2003) cited by Morton in his study on Mexico points out that, shifting to irrigated farming is sometimes seen as a coping strategy in the face of climate variability across developing countries. In further addition Moech and Dixit (2004) point out that in South Asia rural inhabitants

have respondent to drought and floods through increasing livestock production .relative to crops, and selection of crop varieties. Shifting to irrigation and increasing livestock production is not a panacea to climate change vulnerability since some areas might not be endowed with the natural and physical assets to sustain the livelihood strategies.

In order for the rural inhabitants to be able to adapt to climate change there is need to equip themselves properly. In line with this assertion, Denton et al (2001) observed that much has been invested in Africa in terms of capacity building, but more is needed to enhance the adaptive capacity of institutions, organizations and individuals. The government through its various Ministries and institutions has been trying to educate the rural households about climate change and its impact on rural livelihoods strategies, but the uptake of the information has been minimal due to lack of social capital in the rural areas.

Various institutions within the society should work in cohorts so as to come up with various and effective adaptive strategies. Rural areas in as much as they are the worst affected by climate change are often at the periphery as far as climate change is concerned. Institutions in the rural areas are under capacitated to deal with climate change due to lack of financial as well as human capital among other things. There is need to have a good policy framework which is linked to research on adaptation strategies with the rural inhabitants heavily involved in the formulation of the policies so as to ensure the uptake of and sustainability of the climate change adaptation strategies. This is supported by Huq and Reid (2006) who point out that elements of adaptive capacity which are essential are education, access to resources and infrastructure, wealth and better forecasting. Without these, adaptation strategies to climate change will be a futile process.

In a study carried out by Maddison (2006) in Ghana it was observed that some farmers who have observed climate change fail to respond. He observed that, although it is the most experienced farmer who perceives climate change it is mostly the educated that responds. In further support of this Hari et al (2010:12) observed that "a good level of education will increase available livelihood options and enhance adaptive capacity." This is further supported by Smit and Pilifosova (2001) who note that other than climate factors, economic, socio-political, demographic, technological, and institutional factors can affect the livelihood strategies. This then means that in order to come up with sustainable livelihood adaptation strategies there is need to take a holistic approach.

2.6 The gender dimension to climate change vulnerability

Women in the rural areas are more likely to be affected by the increasing environmental degradation and depletion of natural resources due to climate change, because of their interaction with and reliance on livelihood activities which depend directly on the natural environment (Nelson et al' 2002, Terry 2009). In further support of this, Brown (2011:164) argues that "vulnerability to climate change is shaped by gender roles and relations with poor rural women in developing countries generally being considered to be the most vulnerable to climate change."

Women because of the patriarchal societies which characterize most rural communities are at the periphery of the decision making processes and as such their livelihoods are more likely to be affected by climate change because they are not involved in the decision making process as far as adaptation to climate change is concerned. This is supported by Demetriades and Esplen (2010) who argue that women because they lack access to decision making and control over resources, their capacity to adapt to climate change is undermined. This has a detrimental effect and at the end of the day they will be more vulnerable to climate change. In addition Brown (2011) argues that people who are already poor and marginalized will experience the impacts of climate change most acutely. From the above sources women have been portrayed as vulnerable individuals who do not have any say as far as adaptation to climate change is concerned and are only expected to wait for the initiatives from their husbands, fathers and brothers. However women should also be treated as individual entities that are able to make their own decisions as far as climate change is concerned.

2.7 The role of Non-Governmental Organizations in adaptive strategies

According to Chitongo (2013) Non-Governmental Organizations (NGO's) have an important role to play in supporting the efforts of poor people to tackle the causes and effects of climate change on their livelihood strategies. With climate change racking havoc on the livelihood strategies of rural inhabitants, non-governmental organisations have been found to be playing a major role in enhancing the adaptive strategies. In line with this Chitongo (2013) points out that NGO's have a history of facilitating development. On the same wave length Sibanda (1994:16) avers that NGO's mobilise and organize communities for development projects act as watchdogs, give some communities a voice and in some cases NGOs play the role of innovators. Thus NGO's have been playing a major role in trying to educate the rural inhabitants on the causes and effects of climate change on their livelihood strategies. However the role of NGOs in coming up with sustainable

adaptation strategies is still questionable. This is so because instead of coming up with sustainable adaptation strategies there is a tendency of NGOs to come up with short term adaptation strategies. Other than that NGOs have also been accused of not pulling out of community development projects at any time and hence their effectiveness in tackling climate change issues is questionable.

However NGOs in some cases have been argued to be doing a tremendous job as far as climate change is concerned. This is supported by Chitongo (2013) who points out that Protecting Vulnerable Livelihoods Programme an initiation by Catholic relief services focused on the provision of agricultural inputs, promotion of innovative agricultural strategies and appropriate post-harvest technology, strengthening of household and community level safety nets on rural livelihoods. The main objective of the programme was to reduce hunger and extreme poverty. In further elaboration Chitongo ibid points out that NGO's have been seen as a panacea for rural household problems. This is further supported by Vivian 1994 Cited by Edwards (1998) who point out that official agencies often see NGO's as magic bullet which can be fixed in any direction and though often without very much evidence, will still find its target. From the above statement one will note that there is a heavy reliance by the state on the NGO's to help the rural inhabitants in dealing with development issues amongst which is climate change. One should also note that household reliance on NGOs for food handouts inhibits the household ability to come up with initiatives in adapting to climate change.

2.8 Policy framework and adaptation strategies

According to Agrawal (2008) adaptation to climate change demands sound institutional, legislative and policy framework to be effective. In line with this assertion Baird et al (2014.2) point out that the impacts of climate change are induced by public and private actors and cost are socialized at a global scale and experienced at a local scale. Climate change demands the combined efforts of decision makers in diverse institutions across multiple scales (Agrawal, 2010:179). This then means that there should be a policy framework which will inculcate various stake holders with regards to the climate change responses. A sound policy frame work will allow the individual households to come up with sound adaptation strategies which will ensure the preservation of the environment and the sustainability of the traditional agricultural livelihoods.

With regards to the Zimbabwean context the country does not have a specific policy response to climate change. This is supported by Bhatasara (2015) who observes that in Zimbabwe

disconnected policy responses are inculcated in a number of sectorial policies, including those pertaining to Environmental and Resource Management, Water Resources Management, Agricultural and Food Security and Disaster Management. Despite the fact that Zimbabwe as a Country was a signatory at the 1992 United Nations Framework Convention on Climate Change, the draft Zimbabwe National Climate Change Response Strategy was consolidated in May 2013. This shows that the government through its various sectors does not view climate change seriously as it should. This is supported by Brown et al (2012) who argue that climate change is largely viewed as a petty issue in the policy domain leading to insufficient emphasis in terms of policy direction and resource allocation. Insufficient resources have been found to be a major factor in the hindrance of adapting to climate change thereby exacerbating the vulnerability of the rural dwellers and their livelihoods strategies to climate change.

However despite the fact that there is no specific climate change response strategy there are several policy instruments in the different ministries which deal with environmental and climate change issues one way or the other. These include among others the Drought Mitigation Policy, Disaster Management Policy, National Environmental Policy and the Agricultural Policy Framework. With regards to policies which directly affect the rural inhabitants and their adaptive capacity to climate change Nyagumbo and Rurinda (2012) argue that policy implementation guidelines on the utilization of water harvesting technologies and management of water in wetlands that could improve utilization of water in rain fed systems are not clear. With such discrepancies in the policy framework adaptation to climate change might be a problem. This means that there is need for policy formulation and implementation focusing mainly on climate change.

Although wide consultation is done before policy implementation some members of the rural communities will always be left out. Bhatasara (2015) argues that rural people are to a great extent shut out policy making processes and as a consequence, policies developed at central government level are not sufficiently responsive to the policy needs of citizens at the local level. As such there is a high probability that the policies will not be implemented by those concerned. This is supported by Chambers (1998) who points out that development for the people, without the people is against the people.

2.9 How Sustainable are the adaptation strategies in the face of climate change?

The United Nations General Assembly (1987:43) defines sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. This then means that the adaptation strategies being utilized by the present generations must take heed of the needs of the future generations. In further elaboration Harris (2000) ibid points out that an environmentally sustainable system must maintain a stable resource base, avoiding over exploitation of renewable resource system or environmental sink functions and depleting nonrenewable resources only to the extent that investment is made in adequate substitutes. However the concept of sustainable development has come under attack from various academics in the sense that the time frame is not clearly stipulated whether its twenty years or fifty years.

According to FAO (2005) cited by Egyir et al (2015) lessons on agricultural household climate change adaptation span from short term coping measures such as reducing the number of daily meals times , through migration, to adaptation strategies such as adopting productivity enhancing measures. On the same wave length climate change adaptation has been viewed by other scholars as a long term phenomenon in the sense that when farmers using traditional techniques of agricultural production notice that climate change has altered ,they need time to identify potentially useful adaptations, learn organize resources and implement them (Maddison,2006,Smit and Wandel, 2006). However the adaptation strategies which have been implemented by the rural households have been argued to be short term and reactionary and in the long run not sustainable. According to Gwimbi and Mundonga (201) the current adaptation strategies which are being adopted by farmers to deal with the negative effects of climate change are reactive, selective and protective and therefore not sustainable in the long run. This is further supported by Bola et al (2014) in their study of Mbire District who observed that the copying strategies which were adopted by the households were rigid and ill fitted in adapting to the floods and droughts.

One should also note that the adaptation strategies which are adopted by the different communities are not a one size fits all. This then means that what might work for another community might not work for the other community. In some instance the adaptation strategies might be found to be encroaching the boundaries thereby creating conflicts in the end. This is supported by Oshahr et al (2010) who suggest that although adaptation strategies may be effective for one community, it may

undermine the ability of others to adapt through spatial spillovers and negative externalities. In further elaboration Murendo et al (2012) observed that crop diversification, conservation agriculture and fodder conservation are creating conflicts that tend to jeopardize the sustainability of adaptation strategies. From the above discussion the sustainability of the adaptation strategies can be argued to be a questionable task since the adaptation strategies are not only creating conflicts but are also short term measures. In line with this Burton et al (1993) avers that the development and implementation of adaptation strategies demands both short and long term visioning in addition to considering the impact of the options implemented. Thus there is need for the rural household to have a foresight and implement long term adaptation strategies.

2.9 Conclusion

The chapter revealed various forms of literature in order to explain the concept of climate change and its effects on the livelihood strategies of the rural dwellers. Definition of terms was done with terms like climate change and livelihoods being defined in the process. Livelihoods assets were also explored as well as how they are being affected by climate change using case studies from local, regional and international level.

Chapter 3: Theoretical framework

3.0 Introduction

This chapter is going to focus on the theoretical frameworks which are going to guide the research. The sustainable livelihoods approach is going to be utilized. The use of the two approaches will allow the researcher to explore the different livelihoods strategies being adopted by the rural inhabitants as well as their adaptability measures in the face of climate change.

3.1 The Sustainable Livelihoods Approach

The sustainable livelihoods framework as proposed by Scoones (2009) gives an outline of livelihoods strategies which can be practiced by people of a particular community. The livelihood strategies should be guided by policies and institutional frameworks. With the Sustainable Livelihoods Approach there are different forms of asserts which enable the livelihoods strategies to withstand various shocks and stresses. In support of this cifem.ac.uk point out that all livelihood strategies depend upon access to asserts of some kind or other whether such access involves private ownership or other forms of ownership. On the same wave length, UNDP (2005:3) shows that, assets can be tangible or intangible. Tangible assets include food stores, cash savings, as well as trees, land livestock, tools and other resources. Whilst on the other hand intangible assets may consist of education, health services, employment opportunities, claims one make for food, work and assistance as well as access to materials and information. With two or three forms of capital or asserts the individual households will be able to withstand the different forms of vulnerabilities. According to Scoones (1998) the forms of capital or asserts are the natural capital, social capital, human capital and economic or financial capital.

3.2 Application of livelihoods capitals

With the Sustainable Livelihoods Approach there are various forms of capital which can also be referred to as asserts. There are five forms of capital which are natural capital, human capital, physical capital, social capital and financial capital. According to Gidden's (1989) a person's asserts such as land, are not merely means, with which he or she makes a living they also give meaning to that person's world. In further elaboration, DFID (2000) point out that capitals or asserts can be held in private or as common property, borrowed, grabbed, stolen or conquered. What is important is that the local people have access to these asserts when they need them and are also able to use them.

In the case of Chiwore Ward 16A assert accumulation can be argued to be a result of most if not all of the above mentioned means. Dams which are used for irrigation purposes can be classified under common property since they are being used by those living within the proximity. However individual households own their own shallow dams which they use for irrigation purposes. Partnerships have also been formed with those whose water sources dry up quickly having to seeking for partners to carry out their livelihood strategies. In this case it could be classified as borrowed capital since the partnerships and renting of garden space is done on a temporary basis lasting a period of three months at most.

3.3 The changing natural capital and it application

Scoones (1998) points out that natural capital refers to natural resources such as arable land, water for irrigation purposes, air, forest and environmental services such as the hydrological cycle, pollution sinks from which resources flow and the services used for livelihoods are developed. The majority of people in the rural areas rely on the natural capital for their livelihood strategies and it is the natural capital which has come under enormous stress from climate change. In as much as the rural dwellers might rely on the natural environment some of the livelihood strategies have been found to be causing more harm than good to the natural environment. As such some of the areas which were once considered to be resource rich in terms of natural resources need to be reclassified.

The community of Chiwore Ward 16A in as much as it relies on agriculture is an area which is not endowed with natural capital. The land is not fertile and without the use of fertilizers both organic and chemical one will remain in the poverty circles for life. Other than that the area still faces some of the brunts of the liberation war due to the fact that the area was used as ‘a keep’ and as such was affected by deforestation. Firewood is scarce as there are not many trees in the area although there are mountains which are surrounding the place. However one should note that it is the natural capital which is prone to the dire negative effects of climate change since rural inhabitants sorely rely on the natural environment for their livelihood strategies. In order to ensure the sustainability of their livelihood strategies there is need for the local communities to come up with adaptation strategies which will take into cognisance the need to preserve the natural resource base. There is need for the rural inhabitants to come up with adaptation strategies which will sustain natural capital.

3.4 Human capital response to climate change

On another note Hari et al (2010) posit that human capital refers to the level of education and productive skills of the people. Hari ibid points out that a good level of education will increase available livelihood options and enhance adaptive capacity. The fact that rural areas because of their proximity and poor infrastructure, fail to attract the best and qualified personnel is a disservice to the rural communities. This then means that there is lack of adequate knowledge on climate change issues and in the event that there is innovativeness is not being witnessed. However the government through its extension services in this case Agritex provides education on climate change issues as well as various adaptation strategies. In as much as education is a crucial factor in relation to human capital, there is also need to have a healthy workforce.

In this day and age of HIV/AIDS pandemic it is of paramount importance to have a healthy workforce. In the event that one can afford to employ people to work for them they are found to be in a better position to adapt to climate change since they will have the required manpower. However those who can afford to send their children to school are in a better position to adapt. This is so because the children though the comprehension skills that they would have acquired are in a better position to comprehend and interpret the adaptation strategies which would have been brought by NGOs and the Agritex officers. However one should also note that, those who are not gifted academically might come up with better adaptation strategies through their possession of the indigenous knowledge. Local people might come up with better adaptation strategies which only need the uptake of those within the proximity for their effectiveness. Human capital is a crucial asset in adapting to climate change.

3.5 The dwindling of physical capital

With regards to physical capital Hari ibid argue that society, family, group or individual with limited or no physical capital is at risk of non-productiveness which is likely to affect their livelihoods. Physical capital encompasses assets like arable land, livestock and agricultural machinery such as tractors, combine harvesters among others. Physical capital allows people to develop livelihood strategies that improve their resilience to climate change. In the event of shocks and distress physical capital can be turned into financial capital. Some of the adaptation strategies are only possible through the use of the physical assets. For instance having access to land in natural region one is a great asset as compared to someone who has land in the natural region three. However due to climate change physical asserts such as livestock have been found to be dwindling

due to the changes in the climatic conditions. Large quantities of livestock have perished due to the outbreak of diseases as well as moisture stress due to lack of adequate water supply and excessive temperatures. Furthermore arable land is not available for the inhabitants of Chiwore Ward 16A. The land encompasses sandy soils and without the use of fertilizers harvesting anything has been found to be impossible. However because there no other alternative the inhabitants of Chiwore Ward 16A have had no alternative other than continue with agriculture as a livelihood strategy since there are no other alternatives available. In the end adapting to climate change with limited physical capital can be a major problem.

3.6 Social relations in the adaptation to climate change

According to Woolcock and Narayan (2000:3) "family friends and associates constitute an important asset, one that might be called upon in a crisis enjoyed for its own sake, and or leveraged for material gain." On the same wave length Adgar (2003) argues that adaptation is a social process that requires collective action and social capital provides such a solution. In addition to this Hari (2010) points out that people, groups, communities and family in pursuit of their livelihood strategies draw from the resources that are available to them, through their association with others that is through clubs, social networks and affiliations. Through association and relationships, communities learn from each other and they can review past and present strategies and adaptation processes that could lead to better resilience (Hari, 2010). In further support Agrawal (2008:1) argues that adaptation to climate change is inevitably local. It is the people who are on the ground who are in a better position to utilize the available resources in responding to climate change. Local institutions filter the impact of livelihood challenges and hazards and also determine how resident respond (Aldrich et al 2016).

According to Aldrich et al (2016) adaptation to climate change rests on a seasonal component as individuals interact with other network members to gain information, share resources create collective norms and build new institutions in order to provide resilience to climate change. Chiwore Ward 16A is an area of high political activity and is well known as a stronghold for ZANU PF. In order for one to gain access to agricultural inputs and aid from non-governmental organizations in adapting to climate change one has to be politically connected and politically correct. Social capital can be argued then to be a means through which people can gain exposure to innovations as well as managing the resources in response to climate change. New innovations

which come about from different stakeholders and Non-Governmental Organisations usually benefit those who have social and political capital in the rural areas.

Without any form of social capital one is more vulnerable to climate change. Social capital which is more about networking ensures that individual households are able to carry out their livelihood strategies despite the fact that they might not own some forms of capital such as physical and natural capital. Aldrich et al (2016) argue that deep reservoirs of social capital help residents survive climate related catastrophe and accelerate recovery and long term adaptation. Through networking information is shared on how others are adapting to climate change as well as the negative impacts of climate change on their livelihood strategies. Social capital can also serve as the primary institution for local adaptation in the absence of strong state institutions. In the case of Zimbabwe there has been evidence of urban bias to use Lipton's words as such social capital plays a pivotal role in the adaptation to climate change.

3.7 Financial capital and the economic melt down

In addition Dowla (2006) posits that financial capital plays a very important role in determining livelihood options and strategies to the people. Financial capital is the back bone of all the other forms of capital. In addition Hoff et al (2005) observe that access to financial services from banks and micro finance industry improves adaptive capacity and reduces the vulnerability of the poor to climate induced extreme events. This is supported by Chikodzi et al (2012) who argue that wealth enables communities to absorb and recover quickly from shock. In further support cifem.ac.uk point out those livelihoods assets are something from which people derive a flow of income or consumption. However with the financial capital being the backbone of all the other forms of assets one will note that the livelihood strategies are already under stress for the rural inhabitants often lack financial capital due to lack of tangible assets which they can use as collateral security in order to gain access to financial capital from the various institutions. Not only that with the current cash shortages crippling the country, rural inhabitants livelihoods adaptive capacity have been found to be on the verge of collapse. With the government promoting the use of plastic money rural inhabitants have been found to be incapacitated to fully adapt to climate change.

Other than sorely depending on their own finances in adapting to climate change, there is some form of dependence on the outside actors in the form of investments. However the issue of investing has had a further blow due to the introduction of the Bond notes whose value has been

put at par with the US dollar. Rural inhabitants who have saved money for their livelihoods strategies improvement have been found to be under a panic mode due to the uncertainty surrounding the new currency. In addition Millner and Dietz (2014) point out that adaptation to climate change is hindered by lack of resources including financial resources both savings and access to credit. Given the fact that Chiwore Ward 16A livelihoods strategies are agro based and natural capital is getting scarce by each day financial resources are a prerequisite which will allow the sustainability of the adaptation strategies. This is so because people need money to purchase the fertilizers, medicines for the livestock without which both crop and livestock production will be greatly affected.

3.8 Understanding sustainability in relation to climate change

According to Chambers and Cornway (1992:7) argue that" a livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and asserts both now and in the near future, while not undermining the natural resource base." In line with this assertion Carney (1998) cited by, Mos MacNamara and Acholo (2009) point out that one of the strengths of the livelihoods approach is that, it mainstreams the environment within a holistic approach. In this case it is due to human activities in the pursuit of their livelihoods activities that climate change has continued to pose a major threat to the livelihood strategies of the poor and marginalized people. Therefore the question will still remain on whether the adaptation strategies are sustainable or not.

3.9 Strengths of the Sustainable Livelihoods Approach

The sustainable livelihoods approach has its own strength and weaknesses. Starting with the strengths Krantz (2001) points out that the sustainable livelihoods approach provides a holistic view on what resources, or combination of resources are important to the poor, including not only natural and physical resources but also their social and human capital. In addition Krantz (2001) points out that the sustainable livelihoods approach also facilitates an understanding of the underlying causes of poverty by focusing on a variety of factors, at different levels, that directly or indirectly determine or constrain poor people's access to resources or asserts of different kinds and thus their livelihoods. Last but not least the approach provides a more realistic framework for assessing the direct and indirect effects on people's living conditions.

3.9 Limitations of the Sustainable livelihoods approach

However various criticisms have been leveled against the approach. According to De Haan (2012) the Sustainable Livelihood approach has been criticized for dwelling much on the actor agency than on structure, more on neutral strategies than on failed access due to conflicts and inequalities in power. In further support of this, DFID (2000) points out that by improving the livelihoods of a specific group a negative effect may occur on livelihood strategies of others which may lead to normative dilemma on the decision on what to consider with priority. The Sustainable Livelihoods Approach is not a holistic approach in the sense that whilst it might benefit livelihood strategies for the other group it might also prove disastrous for the other group.

DeHaan (2012) points out that by calling resources capitals livelihoods were regarded in an economic view, placing the emphasis on material aspects such as production and income and analyzing livelihoods in neoliberal terms of economic investments and gains. In further elaboration (Ace 2003: 205-206) points out that conceptualizing livelihood strategies in such terms reduces livelihoods to the mobilization and deployment of social and institutional resources for the pursuit of economic and environmental goals.

The sustainable livelihoods approach has also been criticized for ignoring the gender question as well as power dynamics issues. This is further supported by De Haan (2012) who points out that livelihood strategies are not neutral, they inculcate processes of inclusion and exclusion and power is part of that. Livelihood strategies in the playing field are not level for everyone to make their claims. The issues of power dynamics has a large role to play. Women especially due to the patriarchal society they live in are bound to be at the periphery when it comes to claiming various forms of assets which will enable them to adapt to the negative impacts of climate change. This is so because society has put constrains on women on what they can or cannot possess as assets. For instance the Land Tenure Act of 1969 made sure that women were only left with usufructs rights whilst it was men who could own land. On another note, women are not expected to own any form of livestock other than hens which are of insignificant value in the event of livelihood shocks and vulnerabilities. Thus in order to make up for the limitations of the Sustainable Livelihoods the Actor Oriented Approach by Long will be adopted.

The theory gives credit to the individual actor within the society and how the individual might not accept externally driven development programmes. According to Wegerich (2001) the actor

oriented approach is based on the assumption that the individual is both a rational and a selfish actor. On the same wave length Musembi (2000:41) points out that Actor oriented perspective means an understanding of human rights needs and priorities that is informed by the concrete experience of the particular actors involved in and who stands to gain directly from the struggles in the question. In addition Biggs and Mastaert (2004) point out that the actor oriented approach is mainly concerned with mapping relationships and flows of information to provide a basis for reflection and action. Using the actor oriented approach Long examines how social actors respond to similar structural circumstances, even though the conditions might appear to be relatively the same. It is important to understand how the local actors utilize their linkages of knowledge to generate satisfying outcomes.

According to Chekole (2006:17) the actor oriented approach is grounded on the structure actor debate on one hand and on rural development in particular. The theory recognizes individual differences and the need for development agencies to take into cognisance their important role in the development of their communities. Gareau (2012) posits that actors are not simply recipients of information, recipients that absorb incoming information, or disembodied social categories or passive recipients who process information and strategize in their dealings with various local actors as well as with outside institutions and personnel. To use Giddens terms the actor oriented approach recognizes the fact that individuals are endowed with agencies. This therefore implies that given the challenges which have been posed on the rural communities on their livelihood strategies by climate change the rural inhabitants have come up with various adaptation strategies to climate change.

A Verschoor (1992:175) point out that knowledge is a localized rather than a universal accomplishment'' it is highly context specific and may have different meanings for different actors. This then means that the indigenous knowledge systems should be in cooperated in the adaptation strategies to climate change and external actors in the curbing of climate change should not shun away indigenous knowledge systems. In the event that the adaptation strategies are forced on the local actors by external actors there is a high probability that they will reject them. In other words local actors could very well reject externally driven transformations simply to manage outcomes, working together to form a powerful alliance against potentially hostile transformation.

This is supported by Gareau (2012) who postulate that, all groups of actors contain strategies that process information and relate it to their personal life experiences.

3.10.1 Actor oriented tools

With the actor oriented approach there is need to identify the key actors within the communities. The actors could be the ones who bring about or prevent change. This is supported by Biggs and Mastaert (2004) who point out that the key actors could be a national system or a particular group of actors for example farmers. In this case the key actors are the farmers whose main source of livelihoods has come under enormous stress from climate change. It is the farmers who hold the key to the study, as they are the ones who have to come up with a variety of adaptation strategies in order to curb the impacts of climate change.

However the government should not be left out since they are the policy makers and the policies that are initiated should be implemented and adhered to religiously. Through the Environmental Management Agency (EMA) government has been found to be a key factor in the climate change issues, not only hat but a ministry has been set and policy changes have been made in order to ensure that the impacts of climate change on the livelihood activities of the rural inhabitants are minimized. This is further supported by Biggs and Mastaert ibid who point out that in the actor analysis the people, it is the people who make decisions which defines the group. In this case it is both the individuals and the government institutions that make decisions with regards to climate change issues and the adaptation strategies.

3.11 Linkages between the Actor Oriented Approach and Sustainable Livelihoods Approach

Both the Actor Oriented Approach and the Sustainable Livelihoods Approach emphasize the role of the structure and agent in development issues. Thus the two theories are structuration theories with the former giving much credit to the structure and the later to the agent. The Sustainable Livelihoods Approach looks at developmental issues at the community level with members within the community coming up with collective effort and mechanisms to various problems and in this case climate change. Therefore since Mutoko East district is a rural community, individual households come up with various strategies in an effort to combat the negative impacts of climate change. In other words one can argue that there are no uniform adaptation strategies to climate change. Individual households depending with the assets that one has come up with various

adaptation strategies. The actor oriented approach as mentioned earlier sees the individual as a rational being that can come up with adaptation strategies to climate change which suit his needs and are likely to be sustainable in the end.

3.10 Conclusion

The chapter focused on the two theoretical frameworks which are the Sustainable livelihoods Approach and the Actor Oriented Approach. The rationale behind the use of the two approaches is that they complement each other in the carrying out of the research as well as in explaining of the problem at hand.

Chapter 4: Methodology

4.0 Introduction

The chapter focused on the research methodology which the researcher utilized in the gathering and collection of data. The study employed the qualitative research methodology so as to complement the Sustainable Livelihoods Approach which views the individual as a rational being who is able to proffer for solutions when faced with a problem, in this case climate change and its impact on the rural livelihoods strategies. Subtopics such as organization of the field work, gaining entry, selection of participants, selected data collection methods, data collection procedure, proposed data analysis methods and ethical considerations were looked at.

4.1 Research design

Burns and Grove cited by De Langen (2009) define a research design as a blueprint for conducting a study with maximum control over factors that may interfere with the validity of the findings. This is in line with Thakur (2009: 163) who points out that, a research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with the economy in procedure. Adding on to this Polit et al cited in De Langen (2009) note that, a research design is the researchers overall for answering the research question or testing the research hypothesis. From the above definitions, a research design can be defined as a step by step approach in conducting the research so as to achieve the research objectives. In this case the researcher employed the qualitative descriptive design.

4.2 Organization of the field work

Having designed the research tools and sought approval from the supervisor, the researcher sought for the cover letter from the Department of Sociology which was used as an introductory letter during field work. The letter helped in the gaining of entry into the study area. The field work took about six weeks. In the first two weeks the researcher visited the area to accustom herself with the respondents since she is an insider outsider due to the fact that the area is her rural home which she has been visiting since childhood. Introduction to the gatekeepers was done through the use of relative's that is aunts and uncles to be precise. During the third week key informant interviews were conducted with the three Agricultural Extension Officers (Agritex) comprising of two males and one female who had been operating and residing in the area for the past ten years. The fourth stage comprised of the semi structured interviews which were conducted for the selected

households who had been purposively selected depending on the livelihood activities they were engaged in. Having conducted the interviews, for the purpose of triangulation two focus group discussions were conducted during the fifth and sixth week involving the chosen households as well as the Agritex officers. Last but not least was the analysis of data.

4.3 Gaining entry

In order to gain entry into the study area the researcher had to seek for permission from the gate keepers in this case, the ward councilors and the village headmen. The researcher was accompanied by her local relatives in this case it was the uncle who had to act as an acquaintance. The acquaintance introduced the researcher to the gatekeepers who are important for the research to be a success. Gaining access to the individual households at first proved to be a cumbersome task with the Village Headman pointing out that there was need for the researcher to seek for permission from the District Administrator (DA). The Headman cited that without the introductory letter from the DA there was no way he would allow an outsider to interview the individuals citing the reason that the he would be in trouble from the political leaders of the community.

However after the acquaintance had introduced the researcher as his niece the Headman gave the researcher permission to proceed with the interviews since the acquaintance is a respected member of the community. Gatekeepers have the power and authority to organize and call for the village meetings. In this case the gate keepers were responsible for introducing the researcher to the local villagers so as to allow for the smooth flow of the interview processes with the individual households as well as the holding of the focus group discussions. In an effort to avoid unnecessary confrontations the researcher will also be in possession of the cover letter from the University of Zimbabwe, Department of Sociology which will be taken to the village headmen.

4.4 Selection of study participants

Research participants were selected using the purposive sampling technique and the quota sampling technique. Purposive sampling techniques were used for the selection of the Agritex officers who are well versed on issues to do with agriculture as well as climate change. Purposive sampling allowed the researcher to carefully select cases that could typify the subject under study.

This is supported by Ulin (2002) who points out that purposive sampling means selecting research participants for their ability to provide wealthy information.

Quota sampling technique were utilized in the selection of household for the purposes of the study.www.ilo.org defines quota sampling as the selected sample that has the same proportions of units as the universe with respect to a number of known characteristics. With quota sampling the number of participants is predetermined and in this case the researcher made use of thirty respondents. An equal number of males and females were selected for the focus group discussions. Each focus group discussion comprised of three males and three females for balancing purposes. Of the total respondents which were 30, an equal number was selected from each village for validation purposes.

4.5 Selected data collection methods

Masuku (1999) asserts that, research instruments are the backbone of data analysis and are tools used to collect data and information needed to find solutions to the problem under study. Research instruments therefore are tools for collecting data and information needed to find solutions to the problem under study taking into consideration selection, construction of conditions under which these instruments would be administered. The researcher incorporated the key informant interviews, semi structured interviews and focus group discussions.

4.5.1 Interviews

4.5.1.1 Key informant interviews

Key informant interviews are in depth interviews which are conducted with people who are well versed with the events in their communities. Key informant interviews are conducted for the sole purpose to collect vital information from a wide range from individuals amongst which are community leaders, professionals or residents who have an in depth knowledge about the community. In this case the researcher conducted key informant interviews with the Agritex officers who through proper training as well as a lengthy stay in the area had firsthand knowledge about the community. The composition of the Agritex officers was one male and one female.

4.5.1.2 The semi structured interview

Young (1996) argues that, it is important to note that whilst an interview is a two way conversation between an interviewer and the interviewee, gestures, glances, facial expressions, pauses often reveal subtle feelings. Thukur (2009) observes that, there are two types of interviews which are the structured and unstructured interviews. This is in line with Crowl (1993) who notes that, the two types of interviews are categorized according to purpose namely normative or structured and key informant or in depth. The structured interview is characterized by a set of standardized questions which are supposed to be followed when carrying out the interview. However the researcher is free to modify the questions during the interview process so as to get a better understanding of the topic at hand.

In an effort to gather data on the effects of climate change on the rural livelihoods strategies the researcher had to first conduct the semi structured interviews. The interviews were conducted in one week period during which the researcher had to pay personal visits to the respondents. Key informants were household leaders who have stayed in Mutoko East District for more than ten years and have witnessed the changes in the rainfall patterns as well as the increasing temperatures. Ten inhabitants engaged in various livelihood activities were also interviewed. In this regard the researcher had to probe the views of a small number of elite individuals as well as the non-elite in order to get a balanced view on how their livelihoods strategies were being affected by climate change as well as to get an in depth understanding on the adaptation and mitigation strategies that they were adopting in the face of climate change.

The researcher chose the interview in order to be able to observe the facial expressions and gestures which would allow her to get an in depth understanding of how climate change had affected the livelihood strategies in Chiwore Ward 16A as well as the adaptation strategies that they are employing. Respondents were in a position to fully explore the challenges that they were facing in an attempt to diversify their livelihoods strategies in the face of climate change. In support of this Allport cited by Thukur (2009:113) posits that "If we want to know how people feel, what they experience and what they remember, what their motives and emotions are like and the reason for acting as they do why not ask them?" The use of the semi structured interviews allowed the

researcher to observe the non-verbal cues which were very important in the understanding of the topic at hand, as they allowed the participants to express themselves non verbally.

4.5.2 Focus Group discussions

Thomas et al (2012) point out that a focus group is a form of qualitative research in which a group of people are asked about their perceptions, opinions and attitudes towards a product, event, concept or idea. It is an interactive process where people share ideas freely. In this study the researcher conducted two focus group discussions with each discussion comprising of six participants. The focus group discussions were conducted in a period of two weeks with prior invitations having been given through the Village Headman and Ward councilors. Verbal consent was obtained from the focus group participants after the researcher had explained to the respondents about the issue under study.

The focus group participants were purposively selected based on the background information in the district under study. The researcher had to consider the participants duration of stay in Chiwore Ward 16A, livelihoods strategies and the level of education as well as their social status.

4.8 Data Analysis Methods

Babbie (1998) point out that data analysis refers to the treatment performed on data that enables to interpret results. This is in line with Ary (1990) who says data must be organized, described and then interpreted. In this study collected data was organized and analysed using the narrative approach with the researcher coming up with themes in the process. Data generated from the semi structured interviews and focus group discussions was analysed in four different stages. Close reading of raw data to gain an understanding of the key themes as well as listening to the audio recordings was done. Through the use of the set objectives, wide reading and interpretations data was grouped into themes.

4.9 Ethical considerations

Ethical considerations such as informed consent and protection of privacy were observed. Permission to enter the field of study was sought from the Village Headmen as well as the Ward councilor since they are the gate keepers of the community. Individuals gave their consent through word of mouth that is verbal consent. Their names and identities remained anonymous throughout the study with pseudo names being used where necessary. It was the researcher's obligation to

explain to the respondents the nature of the research as well as its implications in verbatim before the individual respondents signed the consent forms.

Chapter 5: Research findings

5.0 Introduction

This chapter presents research findings from key informant interviews, focus group discussions and semi structured interviews. The thematic approach was used as the data is presented in relation to the objectives and the research questions with the impacts of climate change on the rural livelihoods as well as the adaptation strategies which are being employed by the inhabitants of Mutoko East District, Chiwore Ward 16A. The key findings in the study are that indeed the rural livelihoods of the Inhabitants have been affected by climate change and various adaptation strategies have been initiated with the help of different stakeholders.

5.1 Profiling the rural households

5.1.0 Household composition.

Being a patriarchal society the majority of the household leaders are men. The researcher observed that the age of the household ranged from 43 to 56 years and above bringing out the fact that the younger generations were migrating to the urban areas and the neighbouring countries. Cases of female headed families were also recorded with the majority of them being widows. However despite the fact that they were widows they still had a male figure within the extended family that they would report to in the event of any difficulties.

Of the households leaders who were interviewed those who were considered to be educated had reached their O-Levels whilst the rest had managed to complete their primary school education only which is Grade 7. In terms of engaging in the livelihoods strategies all the family members participated in the livelihoods strategies with the school going children giving a hand during weekends and holidays.

5.2 Livelihood strategies for individual households

5.2.1 Classifying rural livelihood strategies

Rural livelihood strategies are diverse and these can be divided into three main groups. The three groups are traditional agricultural livelihoods, locally initiated livelihoods strategies and external interventions. Traditional agricultural livelihoods strategies encompass crop production and livestock production among others whist locally initiated livelihood strategies encompass contract labour, buying and selling and harvesting of indigenous and exotic fruits. External interventions mainly encompass food aid from the NGOs. Of the three classes traditional agricultural livelihood strategies are more vulnerable to climate change.

5.2.2 Traditional Agricultural Livelihood Strategies

5.2.2. 1 Crop production

Crop production is the major livelihood strategies for all the households of Chiwore Ward 16A. This is due to the fact that it is a rural area and people grow their own food crops. Crop grown include maize, groundnuts, sorghum, millet, tomatoes, beans, vegetables and green papers. From the crops grown maize was the most favoured crop as it is a staple crop followed by groundnuts. In as much as small grain crops are resilient to the changes of climate change the growing of small grain crops was still in its infancy. In the event of a normal rainy season maize crop is grown twice a year to ensure food security. Instead of growing the second batch of the maize crop in the ordinary field they plant in the gardens which are big enough. The second batch of crop would help in sustaining the households to the next season. Horticulture produce such as tomatoes, vegetables, cucumbers and green paper were grown in the gardens as a supplement to the food crops such as maize. From the interviews and focus group discussion the researcher noted that crop production was done throughout the year despite the fact that households were facing some challenges as far as water for irrigation was concerned. As was pointed out by one of the respondents water was becoming a major setback for crop production as a livelihood strategies as the hallow dams where drying up quickly as compared to the previous years.

5.2.2.2 Vegetable gardening as a livelihood strategy

From the semi structured interviews and the FGDs, vegetable gardening emerged as a key livelihood strategy. Vegetable gardening was being done irrespective of gender. Vegetable gardens helped in the boosting of financial resources as the produce was sold along the Nyamapanda Highway as well as Mbare Musika. Vegetable gardening as a livelihood strategy was done throughout the whole year. However during the rainy season more focus would be placed on crop production to ensure food security. Due to erratic rainfall patterns some of the respondents pointed out that it was now impossible for them to continue with vegetable gardening as a livelihood strategy since water sources in their gardens were now running out of water. Water being an essential commodity for the livelihood strategy was becoming a scarce and precious resource thereby affecting the rural household's asset base.

5.2.3 Livestock Production as a livelihood strategy

Livestock production emerged as a major livelihood strategy as all the households strived to have some form of livestock be it small or large. From the interviews which were conducted livestock kept by the households ranged from cattle, goats, piggery, and poultry among others. In as much as cattle are a symbol of wealth as well as a source of draught power which is an essential component for agricultural activities the researcher noted that not many households were in possession of cattle. However the majority of the households from the interviews and focus group discussion pointed out that they were in possession of the small livestock such as poultry and goats. Piggery was not favoured by many because of the food consumption by the animals. Of those

households which had pigs they were kept in small numbers at most two because they could not sustain the animals. On further investigation the researcher noted that those who kept piggery were also endowed with the financial capital as they would need to supplement the diet of the animals quite often.

From the interviews and focus group discussion it also emerged that there was a system of equating the value of the small livestock in relation to the large livestock. For instance someone with three adult chickens would be considered to have one adult goat, whilst someone with five goats would have one beast. Possession of small livestock in large quantities ensured that one was in a better ranking as far as physical capital was concerned.

5.2.4 External interventions as livelihoods strategies

External interventions were starting to trickle in relation to livelihoods strategies. During the previous year's Chiwore Ward was a self-sustaining area in terms of food security because of the favourable climate which allowed the households to grow their own food. However with the changes in climate the households of Chiwore Ward 16A had to be incorporated in the food aid programme to ensure that they would not succumb to drought.

5.2.4.1 Food aid as a livelihood strategy

As mentioned above food aid was unheard of in Chiwore Ward due to its self-sustainability. However the failure of food crops due to the changes had seen the ward receiving aid as from 2014 to ease the effects of drought on the rural households. From the interviews it emerged that food aid had brought a sigh of relief for the inhabitants of Chiwore Ward 16A. One of the respondents was quoted saying *"Pakauya UMCO nechikafu ndanga ndaomerwa nekuti mudura manga musina kana chinhu. Zvekuti pavakauya nechibage, pea's nemafuta zvakatotibatsira nekuti vakatipa chikafu"* [When UMCO arrived with the food aid I was in a desperate position because I did not have a single grain in my granary. The coming of UMCO with the mealie meal, peas and Cooking was a major relief because they gave me food.] UMCO which had been working in collaboration with the World Food Programme was providing food aid to the inhabitants of Chiwore Ward 16A in Mutoko with each household receiving aid depending on the number of family members.

Having realized that some households would be left out because of their political affiliation as well as the level of poverty, the NGO instructed the village headman to enlist everyone for the programme because everyone was considered vulnerable. The village headman said, "*veUMCO*

vakatiudza kuti tinyore munhuwese kuti apinde muchirongwa chekutambira, nekuti nzara yacho yanga yasvika pakanyangara zvekuti dzimwe mhuri dzaigona kutofa nenzara" [People from UMCO instructed us to write everyone's name for the food aid programme because the hunger levels was so high to such an extent that we were going to have some families succumbing to starvation.] UMCO had promised to provide food aid up to the month of March with the hope that the local people would have harvested their own produce and would be able sustain themselves. However from the researchers own assessment of the field crops self-sustainability for the majority of the people was not possible since the crops were in a poor state. As shown by the picture below most of the maize fields which were viewed by the researcher were in a poor state and as such food aid would have to continue.

Fig. 1: A maize field in Chiwore Ward 16A

Cases of families inflating numbers of families' members so as to receive more food aid were also noted. From the focus group discussions some were even accused of using the names of their grown up children who had since migrated to urban areas as well as neighbouring countries and to other rural areas where there are more and better resources such as arable land as well as reliable rainfall patterns and better water sources. One of the respondents was heard saying "vamwe *vedu vatisingakwanise kutaura nemazita vakanyoresa vana vavo vakaroriwa newamwe warikuHarare kuti wawane kutambira zvakawanda.*"[Some among us whom we cannot mention by their names

included the names of their daughters who are now married and their sons who are working in Harare for the food aid programme so as to receive more.]

In as much as the key livelihoods strategies were crop production and livestock production there were other supplementary livelihoods strategies which were of paramount importance for the survival of the different households. These included buying and selling, migration, remittances, contract labour, food aid, barter trade and painting. These livelihoods strategies were not uniform to all the households as they would engage in different livelihoods strategies depending on their possession of the different forms of livelihoods assets.

5.2.5 Locally initiated livelihoods strategies

5.2.5.1 Contract labour as a livelihood strategy

Contract labour '*Maricho*' was one of the supplementary livelihoods strategies carried out by those who were considered to be very poor within the community. People would work for small livestock such as chicken or basic commodities such as sugar, salt and cooking oil and maize for mealie meal. Sometimes they would work for cash which they would use for the payment of their children's schools and other expenses. Those who engaged in contract labour had to strike a balance between engaging in contract labour which was a supplementary livelihood strategy and crop production and livestock production as the key livelihoods strategies. Failure to strike a balance between the two would result in become more vulnerable and trapped in the poverty cycle. One of the respondents pointed out that, "*Izvezvi taswera tichidyara beans kwaOvi uko saka ndima yacho yaramba kupera, saka mangwana tichatofumira kopedzisa ndima yasara."* [We spend the whole day planting beans at Ovi's mother but we couldn't finish the task, so tomorrow we will wake up early in the morning to finish the remaining task.] If one fails to strike a balance between contract labour and their livelihood strategies they will be trapped in the poverty circles.

5.2.5.2 Harvesting and selling of wild and exotic fruits

In an effort to boost their finances some households pointed out that depending on the season they harvested fruits and sold them along the Nyamapanda Highway or at Mbare Musika. Harvesting of wild fruits was done at free will as most people were not much concerned about the fruits since they were common property. These fruits included strychnos cocculoides (Matamba/ Hahwa) and baobab fruit which in most cases were neglected by the locals. However when it came to the harvesting and selling of exotic fruits such as Mangoes it was a different story. Initially people would start by selling fruits from their own trees that is those which they would have planted or

inherited and when they were finished they would have to hoard from those who still had the fruits at a negotiated prize. Harvesting of exotic fruits has not been spared from the impacts of climate change as well as the produce depends on the amount of rainfall received during the previous season. This therefore means that in the event of normal and above normal rainfall there will be a bumper harvest, whilst in the event of below normal rainfall the harvest will be low and in the end affecting the livelihoods strategies for the rural households.

5.2.5.3 Buying and selling as a livelihood strategy

Flea markets which were once witnessed in the urban areas were also found in the rural areas. Women in particular were the ones who were involved in the business of buying and selling of small items such as clothes, towels, earrings, makeup kits, hair product only to mention a few. The targeted markets were the vendors at Lot shopping center and All Souls Mission with the vendors targeting school pupils, staff members at the mission and patience at the hospital. Most of the goods sold were bought from neighbouring countries such as South Africa, Zambia and Mozambique as well as from the capital city Harare.

5.3 The impacts of climate change on the traditional agricultural strategies

5.3.1 Crop production and its vulnerability to climate change

The most important livelihood strategy for the rural households is crop production, as such it is crop production which has been more vulnerable to the negative effects of climate change. From the semi structured interviews and FGDs the researcher noted that there has been a reduction in terms of the output as far as crop production is concerned. Most of the respondents pointed out that for the past ten years or so maize yield were dwindling bit by bit. Asked of the reasons why they were witnessing such drastic changes in terms of their yields, the respondents pointed out that there were changes in the rainfall patterns with low rainfall being received as well as an increase of dry spells in between the rain season. The respondents also pointed out that normally they used to receive rainfall as early as October and would expect dry spells in the month of January during which they would be weeding the fields, but the situation has since changed. Instead the rains would come as late as end November or by mid-December which was affecting their planting and would result in the crops not reaching their maturity in the event that the rains go early as was now the case.

Figure 2: Poor bean crop in Mutoko East District Ward 16A (Chipara 2017)

Having received the rains very late the households were also witnessing persistent heat waves during the agricultural season which would result in the wilting of crops. This is supported by Gukurume (2014) who observes that poor rains and persistent heat waves have resulted in the wilting of grown crops and poor germination of seeds. Compounded with poor soils households were in a fix especially those who did not have financial resources to purchase fertilizers as it was a prerequisite in order for one to harvest something.

However the 2016-17 seasons was reported to be different by the respondents as they had received above normal rainfall. In as much as the people were celebrating the coming of the rains in their large quantities some were crying foul. From the semi structured interviews some of the respondents pointed out that they could not plant anything in their gardens due to water logging. Some even pointed out that water was reaching their knee length and as such there was no way they could have planted anything. Those who whose gardens were water logged had decided to wait until April with the hope that the water level would have normalized. This is in line with Chikodzi et al (2012) who say, climate change has altered the rainfall patterns, amplified drought cycles and increased the frequency of severe weather patterns. Having accustomed themselves to the fact that the years of normal rainfall are over the respondents pointed out that they had run out of seed rice to which they said they would have made a bumper harvest with the above normal rainfall.

Fig 3: Poor maize crop in Mutoko East District Ward 16A (Chipara 2017)

5.3.2 Vegetable gardening and its vulnerability to climate change

Vegetable gardens are a major source of livelihood for the households of Chiwore Ward 16A since the area is well known for market gardening. Normally gardening activities would be done throughout the year with the exception of the rainy season during which more time would be spent in the maze fields. Due to the negative effects of climate change some of the households have been found to be abandoning gardening activities altogether. This was due to the fact that water sources in their individual gardens have dried up during the course of the year which was unheard of in the past. As was pointed out by one of the respondents during the interview sessions "*Makare kare taitopedza gore rese mvura irimo mumadhamu, tichidiridzisa asi mazuvano madhamu edu akupwa.Kana achinge apwa zvinhu zvinenge zvatotiomera nekuti ndimo matinowana chouviri imo mumagadhe"* [Long back our small dams would have water throughout the year which we would for irrigation purposes, these days our shallow wells are drying up before the end of the year. When they dry up life will be hard for us because it is from the garden produce that we sell that we are able to make ends meet.] Excessive temperatures during the course of the year have been affecting the water tables thereby affecting the water sources in the end which is crucial for the livelihoods strategies of the rural households.

The quality of crop produced was said to have depreciated and this has since affected its market value. Due to excessive temperatures tomatoes would be watery and this would result in the crop going bad quickly. In order to avoid unnecessary costs, small holder farmers would have to consume the crop themselves other than transport the poor crop to the marketplace where it would fetch a lower price and in the end reduce the meager profits. Other than that in the process of

transportation vegetable produce were also susceptible to the extreme temperatures especially during the spring season. Due to the fact most households do not have a source of transport of their own, they had to form coalitions with other households which would result in some form of delay. Extreme temperatures would affect the freshness of the produce and at the end they would fetch a lower price thereby affecting the financial capital at large.

5.2.3 Livestock production and its vulnerability to climate change

According to Chikodzi et al (2012) climate change has increased agricultural pest and disease. This is supported by FAO (1990) which observed that one of the impacts of climate change on agriculture as the major source of livelihood for the rural households is the manifestation of vector and vector borne disease. Due to climate change livestock has been prone to pest diseases. From the semi structured interviews the researcher noted that livestock losses had been experienced by the households. On average the researcher observed each household had lost at least two beasts. From the FGDs diseases such as red water and sweating sickness were mentioned in the process.

Due to erratic rainfall pasture for livestock was becoming a problem to such an extent that some of the respondents pointed out that it was unsustainable to keep cattle as livestock as they were more likely to die from hunger losing a valuable asset in the end. Asked on whether they were not harvesting fodder for their cattle the respondents pointed out that there wasn't much for the livestock as the fodder would have been already affected by the poor rains and the dry spells.

The respondents also pointed out that water for the livestock was quite a challenge as they had to dig shallow wells ' *Mafuku'* in the river that is, Mudzi River and drain the water using irrigation engines and fill the dishes for the animals to drink. They could not do it on a daily basis as it was a tiresome task, instead they had to skip some days as it was a tiresome task for them. The use of irrigation engines was not applicable to all the households due to the fact that they are expensive both to buy and to maintain. Of those households which did not have access to the engines to pump water for their livestock they had to seek other alternatives. On further investigation the researcher noted that some households instead of throwing away water which would have been used for the carrying out of household chores they would instead keep it for their livestock.

Other than that some households pointed out that they had to travel long distances in search for water for their livestock which was a strenuous task for the already starved livestock and the owners as well. On further investigation it was reviewed that they had to travel a distance of 15

kilometers to the nearest dam and 15 kilometers back. One respondent was quoted saying "*Kuti mombe dzedu dziwane mvura yekunwa, taitofamba kuenda kuseri kwaLot uko kune dhamu ririko Chipwanya. Taiti tikanodzinwisa nhasi tosvetuka zuva rimwe chete tozonodzinwisazve nekuti pane kamufambo"* [For our livestock to get water to drink, we had to travel to Chipwanya Dam which is behind Lot Township. We would skip a day in between because of the long distance.] The situation was worsened by the fact that there are no functional boreholes in the ward. With such a scenario the inhabitants in Chiwore Ward 16A had a torrid task in trying to make ends meet both for themselves and their livestock.

5.4.0 Adaptation strategies in the face of climate change

From the interviews both key informant and semi structured and focus group discussions the researcher observed that adaptation strategies were being adopted by the households of Chiwore Ward 16A in response to climate change. the adaptation strategies ranged from the growing of small grain crops, practicing conservative agriculture, using drip kits as irrigation tools, using '*tsoka tsoka'* as an irrigation tool, forming partnerships with those who have natural capital, negotiating for rains with the ancestral spirits, harvesting of fodder for the livestock, engaging in barter trade, growing short seasoned crops as well as relying on food aid from the NGOs. In adapting to climate change the researcher noted that there was the mixing of farming and off farming activities by the rural households. The mixing of farming and non-farming activities would allow them to diversify their livelihoods strategies thereby ensuring the sustainability of both the traditional agricultural strategies and the locally initiated livelihoods strategies.

5.4.1 Growing small grains as an adaptation strategy.

From the focus group discussions the growing of small grains also emerged as one of the adaptation strategies which the households of Chiwore Ward 16A had adopted. However the researcher noted that the uptake of the growing of small grains was very minimal due to various factors which was cited by the respondents. One of the major reasons was that the small grains are most likely to attract qualia birds and as such the harvest would be minimized which would be a disservice to the households. Some pointed out that the growing and processing of small grains such as sorghum and rapoko was quite a laborious task whilst others pointed out that they were the poor men's crops adding that they were grown by those who could not afford fertilizers. On further analysis the researcher noted that the majority of the respondents viewed maize as a prestigious crop and as

such would prefer the growing of maize despite the fact that the crop is more vulnerable to climate change.

On further investigation it was reviewed that households preferred other small grains over others. The headman pointed out that he observed that in his area of jurisdiction not even a single household had grown sorghum. The Headman was quoted saying"Mudunhu *muno mese hapana kana musha mumwe chete wandati ndaona wakarimwa mhunga*" [In this whole village I haven't seen a single household which has planted sorghum]. In support of this Musevenzi (2012) in his study of Muzarabani, Mwenezi and Gokwe pointed out that switching people from maize as a staple and security crop for their livelihoods was quite a challenge since the communal farmers have so much belief in the crop. This is in line with Manyani (2010) in the study of Gwanda when she argued that due to persistent drought there is need for people to shift from maize production to small grain production. On further investigation, the researcher noted that the government through the Agricultural Extension Officers was advocating for small grain production. However the small grain production campaign was not being done decisively as such there was the low uptake of small grain production as an adaptation strategy to climate change. Other than that the researcher noted that the majority of the households did not have an in depth knowledge on the benefits which could be derived from the growing of small grain crops, as such there was need for an active awareness campaign on the uptake of small grains as an adaptation strategy to climate change.

5.4.2 Practicing Conservation Agriculture as an adaptation strategy

From the key informant interviews the researcher noted that there was the encouragement of the use of the conservation agriculture as an adaptation strategy in response to the negative effects of climate change. From the interviews the researcher noted that conservation agriculture is an agricultural mechanism which advocates for water conservatory methods. The method encourages minimum tillage of the land and had been given a pseudo name called '*Dhiga Udye*' which can also be referred to as the pot holing method. The assumption is that you only disturb where you want to plant and as such there is minimum disturbance of the natural ecosystem and water loss is minimized. The argument is that 'the plough is the enemy' as it disturbs the natural ecosystem. With conservation agriculture there is the covering of the soil though mulching and this helps in the improvement of soil fertility and moisture conservation.

Burning of crop residue is discouraged as this will contribute to ozone layer depletion. When using conservative agriculture there is need for the use of available resources and materials as such those with very little financial resources are able to produce. Instead of using chemical fertilizers there is the encouragement of the use of compost manure as well as livestock manure. The increase in temperatures provides the idle conditions for the compost making process. This is supported by Chikodzi et al (2013) who point out that with climate change numerous opportunities have been presented such as early crop maturity and the rising temperatures can increase the rate of organic matter providing a conducive environment for microorganism activity in the breakdown of the matter that increases soil fertility. This then means that with conservation agriculture farmers would utilize the increases in temperatures to their own advantage. Dry planting is encouraged as such one will have a better chance of having a better yield despite the fact that the rains might be delayed.

Pot holing as an adaptation strategy was mentioned in the semi structured interviews as well as in the in depth interviews and the focus group discussions. The major advantage of using the system was that it was an effective way of retaining moisture as it would help in the prevention of the water runoff. Other than that conservation agriculture was argued to be cost effective since farmers would have to use the locally available materials instead of using chemical fertilizers which they would have to buy at exorbitant prices.

However on further analysis the researcher noted that there was a low uptake of the pot holing system with the inhabitants citing that the system was a strenuous process which required more time than that which was readily available. On further investigation the researcher also noted that when using the pot holing system land preparation would have to start as early as July. This would collide with the other livelihood strategies such as market gardening. As such in as much as it was a very good adaptation strategy in the face of the changing climate most households had shunned conservation agriculture.

Other than that the researcher also noted that the inhabitants of Chiwore Ward 16A did not have the adequate and in depth knowledge about conservation agriculture. There was need for the adequate and proper training with regards to land preparation, the planting process, compost making procedures especially when it comes to the temperatures requirements during compost

making among others. Lake of knowledge proved to be a hindrance to the uptake of the conservation agriculture as an adaptation strategy.

5.4.3 Drip kit irrigation

Another adaptation strategy which emerged from the interview processes and focus group discussions was the utilization of drip kits as irrigation tools. The kits were introduced by NGO's and were an effective irrigation tool for horticulture purposes as the farmers would use as little water as possible from the planting process to harvesting. However on further probing the researcher observed that drip kits were not readily available to everyone as there were some restrictions in accessing the kits themselves. On further investigation it emerged that the inhabitants of Chiwore Ward 16A had to pay an amount of $30 per household in order to purchase the kit which was an exorbitant fee for an unemployed rural dweller whose source of income had already been dwindled by the effects of climate change. Other than that the researcher also noted that those who had political capital were the ones who were in possession of drip kits. For instance from those the interviewees the researcher observed that only the Ward Councilor and the Headmen were the only ones who had the kits. On further investigation it emerged that the kits had been donated to them as a way of luring others to purchase the kits. In as much as the use of drip kits was said to be an effective irrigation tool and a noble adaptation strategy to climate change not many people could afford the kits thereby proving the fact that it was not a sustainable adaptation strategy.

5.4.4 Using '*Tsoka tsoka'* as an irrigation tool

Through their own innovativeness households from Chiwore Ward 16A had come up with adaptation mechanism for irrigation purposes which is known as '*tsoka tsoka*' whereby they make use of their feet to pump water up to the required parts of the fields. The method is used when water levels have reached very low levels and many of the households could afford as they used the locally available material to make one. Asked on how the method works one of the respondents elaborated that "*Mvura inenge irisekunoku, uchida kupombera kuti inodiridzira sezvakaita seuko, saka unenge uchitsika tsika chigubhu mvura ichienda kwaunoda kudiridza. Tinowanzoshandisa tsoka tsoka kana mvura yanyanya kudzika mumadhamu medu"*[Let's say water is somewhere here, and you want to pump water somewhere there, so you will be stamping your feet in such a manner will be pumped to the designated area. We usually use this method when water levels have reached its lowest levels in our shallow dams.] In as much as the method has proved to be effective in terms

of pumping up water to the crops it is a tiresome process which can only be carried out by those who are physically fit and healthy. In some instances there would be need for the entire household member to be involved to take turns in the pumping process. On further investigation it was revealed that the method is usually used by those who do not own any form of irrigation equipment and lack the social capital to gain access to the irrigation equipment.

5.4.5 Partnerships formation as an adaptation strategy

With no other livelihood strategy to turn to partnerships were being formed between the rural households. The partnerships were usually formed between the households whose sustainable water sources and those without sustainable water sources. Usually those who had irrigation equipment and other forms of physical capital were approached by their counterparts to form partnerships with regards to market gardening as livelihood activities. When in partnerships the involved parties shared everything from the labour taking turns to mane the crops and sharing the money to buy fertilizers for the crops.

Proceeds were also shared equally despite the fact that one of the partners would have contributed more in terms of the natural capital such as land and water source. One of the respondents pointed out "*kana mvura yapera mumagadhe edu tinoita macompany nevamwe vane magadhe asinga peri mvura. Tinongowirirana kuti togowana zvakadii pakutanga paya ingava fetireza tinotenga zvakafanana asi tichibatsirana kubva mukudyara,mukusakura tozogowana mari yacho pekupedzisira"* [When our gardens water sources have dried up we form partnerships with those who have gardens with water sources. We reach an agreement in terms of amount of fertilizer and the contributions each is going to put, planting, weeding and we share the proceeds at the end.]However on further investigation it was revealed that those households which owned gardens which had better water sources sometimes demanded some form of payment for the use of their land in the form of fertilizers or a bigger share from the proceeds.

5.4.6 Negotiating for rain with the ancestral spirits

Some of the household leaders pointed out that persistent drought which was being witnessed in the area was a result of the reaction of the ancestors. As such the only way that they could receive enough rainfall was through the appeasement of the spirits. On further investigation it was revealed that with the intensity of the drought during the 2015- 2016 season there was a realization that there was need to appease the ancestors and negotiate for rain. As a result traditional rain making

ceremonies were conducted by the local leaders and with above normal rainfall for the 2016-2017 season the belief among the households was that ancestors had heard their prayers.

One of the respondents pointed out that "*chikonzero chaita kuti mvura isanaye inyaya yehunhu hwevana vemuno hwarasika. Saka zvadaro gore rakapera takaenda tikanotsvairira mugomo nekunoita mafuwe mugomo munanyamatunzvi. Mushure mekunge vanhu vaita mafuwe mvura yakabva yanaya kwapera masvondo maviri.* [The reason why we are having consistent rainfall is because of the mischievous behavior of the young one. Last year we went to Nyamatunzvi Mountain to do some cleansing and appeasement ceremonies so as to receive rains. After performing the traditional ceremonies 'Mafuwe' we received rains after two weeks]. Some of the inhabitants of Chiwore Ward 16A still view the change in the climate as a reaction on the part of the ancestors for the shameful behavior which is being displayed by the younger generation. On further investigation it emerged that some of the shameful behavior included improper dressing, premarital sex among others. Climate change could only be combated through the instilling of good morals among the youths for those who view it through anthropological lenses.

5.4.7 Harvesting of fodder for livestock

With the erratic rainfall patterns pasture for livestock has become a critical problem. In order to ensure some form of food security for the livestock especially cattle households were harvesting fodder for the livestock soon after harvesting their crops. The fodder would then be given to the livestock when the pastures are scarce and hard to come by. One of the respondents was quoted saying, "*Kana tichinge tapedza kuhohwa zviyaizvi mmbe dzisati dzakusairirwa, tinovaka madara mumatanga emombe ayo atinzoshandisa kuisa mashanga echibage kuitira kuti kana mafuro akuita mashoma mombe dzedu dzinenge dzine chekudya. Mashanga aya hatimaburutse ese kamwechete, tinoburutsa mashoma mashoma tichisvetuka zuva rimwe chete kana mairi*." [When we are done with harvesting before the livestock is left to go astray we build pillars in the kraals which we use for stocking the fodder for future needs. When the time comes we give the fodder to the cattle in small portions skipping a day or two in the process.] The harvesting of the fodder from the researchers analysis is just a temporary adaptation measure since the fodder would not be enough to reach the next rain season. Despite that maize plants will be of poor quality and at times might not have reached maturity level due to excessive temperatures means that there won't be much to harvest.

5.4.8 Engaging in barter trade as an adaptation strategy

From the semi structured interviews and focus group discussions the researcher noted that barter trade was another adaptation strategy which was being used by the inhabitants of Chiwore Ward 16A. Women were among the majority who were engaging in barter trade, having to travel places with their tomato filled containers to carry out barter trade with the staple crop which is maize. One of the respondents was quoted saying "UMCO *payakanga isati yauya taitoenda nemadomasi kucorner store uko kwataichinjanisa pureti yemadomasi nekadonor kechibage."* [Before UMCO came with the food aid, we would travel to Corner Store were we would conduct barter trade changing a plate of tomatoes in exchange for a five liter tin of maize]. From the discussion it emerged that engaging in barter trade was a strenuous processes as long distances had to be travelled whilst at the same time carrying a 20 liter bucket full of tomatoes on the head and the maize which they would have got on the other hand. Sometimes they would travel the whole day without getting much because people from Corner Store had realized that they had bargaining power. Various forms of exploitation were being witnessed by the traders, thereby further impoverishing the individual households.

5.4.9 Mixing farming and non-farming activities as an adaptation strategy

With climate change particularly affecting the agricultural activities some of the households of Chiwore Ward 16A have resorted to mixing their livelihoods strategies which are agro based with non-agro based livelihoods strategies. The non-farming activities include among others remittances, buying and selling and migrating among others. Flea markets which were once associated with urban areas were now evident in the rural areas. Clothes, kitchen utensils and other beauty wares were being sold along the Nyamapanda Highway at Lot township and at All Souls Mission with those selling at All Souls mission targeting school pupils, nurses, teachers and patients who would have visited the hospital as their customers. Whilst others had since townships to run their Flea markets others had to travel on a daily basis to the townships to sell their wares during the dry season when they no longer had water in their small gardens. Some of the respondents pointed out that sometimes they had to travel to Nyamapanda border post to sell their wares. This they would do on a one day journey which would start by leaving in the wee hours of the morning such that they would arrive during the early hours of the morning sell their wares and depart from the market center for home around three O'clock in the afternoon.

Some had since migrated to the urban areas such as Harare where they had sought for some form of employment or engaging in some form of informal employment. Remittances were also found to be helpful from the focus group discussions as well as semi structured interviews with those who had children who were working in the urban areas as well as neighboring countries being in a better position to adapt to climate change. In the event of drought those with relatives and children who had migrated to the neighbouring countries would receive food aid and other staff and as such they were better off as compared to their counterparts.

5.4.10 Growing short seasoned crops as a response to climate change

Having noticed that the rainy seasons were becoming shorter and shorter, the Agriculture Extension Officers through their expertise were found to be encouraging communal farmers to grow short seasonal crops. The growing of short seasoned crops would help in terms of food security as they would reach maturity within a short timeframe of two months. One of the respondents said"*Makare kare mvura ichirikunyatsonaya taidyara mbizi ndiyo yainyatsotipa goho rakanaka. Asi nekunetsa kwakuita mvura takudyara tsoko. Tsoko katwo months, zvekuti kana mvura ikakasika kuenda hauzoshaiba chokudya"* [Long back when we had adequate rains we would plant '*SeedCo Mbizi*' and we would have good yields. With the erratic rainfall patterns we have since shifted to '*SeedCo Tsoko*' since it reaches its maturity within a period of two months. In the event of a short rainy season we will harvest as such we will not starve]. The use of short seasoned crops allows for the inhabitants of Chiwore Ward 16A to harvest thereby ensuring food security in the long run. However in as much as it was a good adaptive strategy the short seasoned crops had their fair share of problems. They were prone to pest attacks whilst in the field before they were ready for harvest.

5.4.11 Non-Governmental Organizations and the provision of food aid

External interventions by NGO's have since started to trickle in to offer help as far as livelihoods activities were concerned. Of note is CADS which means Cluster Agricultural Development Services which has introduced the use of drip kits, Conservative Agriculture, COMMUTECH (Community Technology Development Trust) and United Methodist Committee on Relief (UMCO) which is working in collaboration with the World Food Programme. This is supported by Sibanda (1994:16) who points out that NGO's mobilize and organize communities for development projects, act as watchdogs, give some communities a voice and further in some cases NGO's play the role of innovators. In this case CADS which is an NGO had managed to both

mobilize and become innovative by implementing drip kits which were used for irrigation purposes which uses very small quantities of water.

The government through its extension services such as Agritex officers was also not left out as they were working in cohorts with NGO'S such as CADS on educating people on Conservative Agriculture and making use of drip kits. The introduction of the conservation agriculture had come as a relief to those whose livestock had been wiped out due to drought and diseases as they were able to plant at the same time with their counterparts. It was revealed that those who used the pot holing system would start their land preparation as early as July such that by November when the first rains fall the land will be ready and they would plant their crops at the same time with those who had livestock to use for draught power.

5.4 Questioning the sustainability of the adaptation strategies in the ever changing climate.

Sustainability as a concept is marred with a lot of controversies with academics questioning the time frame for which something can be called sustainable. From the researchers own assessment not all adaptation strategies which were being adopted were sustainable. From the data analysis the adaptation strategies which were being implemented by the households were not sustainable as most of them were coming from outsiders and as such they were facing some form of rejection from the community. In as much as various stakeholders were making frantic efforts to adapt to climate change there was some form of resistance on the adaptation strategies. Some of the respondents pointed out that the adaptation strategies which were being introduced to them were experimental not practical hence the reason for the low uptake of the adaptation strategies. One example which was cited was that of potatoes which were grown in sacks, those who took part in the potato production pointed out that the yield was poor if any. On further analysis it was observed that there is need for proper research to be conducted before new innovations are introduced to the rural households and implemented as far as adapting to climate change is concerned.

The use of drip kits was also found not to be sustainable due to the fact that there is need for the inhabitants to have political capital and financial capital, physical capital and most of all natural capital. The prices at which the drip kits are being sold were beyond the reach of many households and as such not many households were utilizing them because of their inaccessibility. Other than that there was need for proper training to be conducted on how to set up the kit as well as on how

to use the kits effectively which was not done. From the focus group discussions it was revealed that proper training was not done since there was a low uptake of drip kits because they are expensive.

The use of conservative agriculture was also found to be an over celebrated issue since there has been a low uptake of the system. Some of the respondents pointed out that they had come up with another name for conservation agriculture as they were now referring to it as '*Dhiga ufe*' a term which used in reference to how strenuous it is to use the system. Other than that conservation agriculture was accused of being a strait jacket method which does not into consideration various factors such as the ecological region and soil types and as such people have since been rejecting the method citing various reasons amongst which are the method requires a lot of time in terms of land preparation, compost making and so forth.

Moving on to the uptake of small grain production since they are drought resistant crops, the inhabitants of Chiwore Ward 16 A pointed out that the fact that small grains are prone to pest attacks whilst they are still in the fields especially Qualia birds made them less attractive to grow despite their enormous advantages to climate variability. The government on the other hand has not been found to be advocating decisively for the uptake of small grains production as an adaptation strategy to climate change but instead they has been advocating for the growing of maize. For instance during the 2016-2017 agriculture the Vice President of Zimbabwe Honorable Emmerson Mnangagwa launched a command agriculture programme which promoted the growing of maize crop for food security despite compelling evidence of the changing climate. With such kind of programmes, government resources were channeled towards the growing of maize for food security whilst small grains were abandoned despite their resistance to the harsh climatic conditions.

The planting of short seasoned seeds such as '*tsoko*' had their own fair share of problems since they were said to be prone to pest attacks again whilst still in the field before the crop had been harvested. As pointed out by one of the respondents " *Tsoko ehe inokasika zvayo kusvika kana waidyara asi dambudziko rinozouya pakuti inofukutwa ichiri mumunda"*[Yes we can use short seasonal crops such as *tsoko* but the problem is, it is prone to grain weevils attack whilst it is still in the field before being harvested].Despite the fact that growing short seasonal crops has the advantage of reaching early maturity and ensuring livelihoods sustainability and food security the

inhabitants of Chiwore ward 16A are reluctant to grow short seasoned seeds for the reasons cited above.

Relying on food aid from the donor as an adaptation strategy was also found to be not sustainable as an adaptation strategy. This is so because the donor community relies solely on funding and as such if the funder pulls out which he can do anytime then that will be the end of it. In this case whilst the researcher conducted her field work in February, aid was said to be given up to the end of March. Households would be left vulnerable again as they could not negotiate for the extension of the food aid provisions with the donor in their own capacity. However from the focus group discussions and the semi structured interviews the researcher observed that through receiving food aid, a dependency syndrome had been created within some individual households and as such they had become reluctant to such an extent of not becoming innovative because they knew that food aid would come. In line with this ZimVac (2011) points out that the consequence of this dependency syndrome is the dwindling of the coping capability and expansion of existing livelihood strategies and this has devastating and protracted implications on livelihoods security in this area. With the dependency syndrome people would no longer exercise the use of their agencies when faced with the calamities of climate change which has had a negative effect on their livelihoods strategies.

5. 5 Conclusion

The chapter focused on data presentation and analysis on the topic under discussion. From the discussions it emerged that the rural livelihoods activities Chiwore Ward 16A in particular were being affected by climate change. The most vulnerable of the livelihoods strategies were the traditional agricultural strategies such as crop production, market gardening and livestock production. In an effort to adapt to the various challenges from climate change, households were coming up with various adaptation strategies amongst which are growing of small grain crops, harvesting of fodder for the livestock and growing short seasonal crops. However the sustainability of the adaptation strategies to climate change is highly questionable.

Chapter 6: Discussion of research findings

6.0 Introduction

The chapter discusses the research findings as presented in the previous chapter in response to the research objectives. The research objectives were to identify the effects of climate change on the rural livelihoods activities, identify the adaptation strategies which are being adopted by the rural households and to ascertain whether the adaptation strategies were sustainable or not. The preceding chapter contributed to the understanding of how the rural livelihoods strategies have been affected by the changes in the climatic conditions as well as identifying the adaptation strategies which were being adopted by the rural households. The sustainability of the adaptation strategies was also interrogated given the fact that climate change is a world problem with no foreseeable solution in the near future. Livelihoods strategies were grouped into three categories which are traditional agricultural livelihood strategies, external interventions and the locally initiated livelihood strategies. Of the three categories the researcher noted that it was the traditional agricultural livelihood strategy which was more vulnerable to the effects of climate change.

6.1 Vulnerability of traditional Livelihood strategies

6.1.1 Crop production declines because of the changes in climate

Climate change has affected almost every facet of the day to day activities of the rural households. However the most vulnerable of all was crop production, market gardening and livestock production since they heavily relied on the natural environment. Due to climate change food security was under threat as there has been a reduction in the crop yields. This had been necessitated by the late coming of rains, frequency of dry spells which could last for up to two weeks at times resulting in the wilting of crops and thereby affecting the normal growth of the plants. This is supported by Chikodzi et al (2012) who observed that climate change has altered the rainfall patterns, amplified drought cycles and increased the frequency of severe weather conditions and increased agricultural pest and disease. Due to the changes in the acute changes in the weather patterns food crops were prone to pest and disease attack such as grey leaf, and pest attack such as army worms which would in the end affect the produce. In further support of this Mutami and Chazovachii (2012) in their study of Mudzi District highlighted that stresses and shocks stimulated by climate change include exceeding high temperatures, delays in the onset of rains, unpredictable rainfall patterns moderate and severe droughts and dry spells, crop failures

and livestock losses among others. However despite the above mentioned effects rural households in Chiwore Ward 16A are continuing with crop production as the main livelihood strategy due to lack of resources to diversify their livelihood strategies.

6.1.2 Shifting from large to small livestock production

Livestock losses were also recorded to be on the increase which has since affected the asset base for the rural households. This is in total contradiction with Moech and Dixit (2004) who noted that in South Asia rural inhabitants have respondent to drought and floods through livestock production. Livestock diseases such as red water was reported to have caused a number of deaths especially on cattle whilst small livestock such as goats succumbed to diseases such as kidney pulmonary disease and heart water. In an effort to combat livestock losses households were resorting to small livestock such as poultry which were not only easy to keep but also less prone to diseases. Small livestock tend to have a relative advantage over large livestock due to the fact that they breed at a faster rate as compared to large livestock.

However small livestock such as poultry topped the list as they were cheap and multiply in numbers quickly. On further analysis the researcher observed that some forms of livestock such as pigs were kept in small numbers with very few families because of their high demand for food. Households which kept pigs the researcher noted that they were financially stable as they could afford to buy the food supplements. The loss of large livestock such as cattle means that the assert base for the rural households has been affected. Cattle are not only used for consumption purposes but are a major source of draught power which is a critical component to the carrying out of other livelihoods strategies such as crop production and vegetable gardening. They also provide manure which will be used in the fields instead of using chemical fertilizers. As a result the loss of livestock in large numbers means that the traditional agricultural livelihood strategies will be negatively affected.

6.1.3 Initiatives on irrigation equipment

Market gardening which is another traditional livelihood strategy was also found to be vulnerable to climate change. The effects ranged from the unavailability of water for irrigation purposes to poor quality produce due to exposure to excessive temperatures. In an effort to reduce the impact various adaptation strategies were being used such as the use of drip kits as well as '*tsoka tsoka'*

as irrigation tools. However despite the use of various adaptation strategies with regards to traditional agricultural strategies, rural households livelihoods strategies were hinged on the natural resource base and as such will continue to be vulnerable to climate change.

On further analysis the researcher noted that the rural households were continuing with the growing of maize as a staple crop despite the fact that the crop is not resilient to the dry spells and the increasing temperatures which have become the order of the day as compared to the small grains. The uptake of small grain crops such as sorghum and '*rapoko'* was still at a minimal stage with the households preferring maize instead. Manyani (2010) in her study of Gwanda ponders the questions why small holder farmers despite having noticed the changes in the climatic conditions continued to produce maize. From the researcher's own findings, despite the fact that maize is a staple crop most of the respondents cited the fact that they favoured the maize crop as compared to small grains because it was less prone to pest attacks. On further analysis the researcher observed that maize crop had been elevated to higher levels as compared to small grains which were considered as poor men's crops. Other than that the preparation process before consumption is a laborious task as compared to maize which is processed easily and can be consumed in various forms.

6.1.4 Resisting small grains as an adaptation strategy in response to climate change

The researcher also noted that there was need for the rural households to be educated on the benefits which would be accrued from the growing of small grain crops in the face of the ever changing climate. Rural households need to be taught on the nutritional value of small grain crops and their resilience to the drought conditions which would enable them to ensure food security in the end. With the most educated of the household leaders having reached Ordinary Level the uptake of small grain crops would be a hard process.

In as much as the small grain crops might be drought resistant some of the climatic conditions were severe to such an extent that even the drought resistant crops would not make it to full maturity. This is supported by Bhatasara (2015) when she pointed out that the 1991-1992 droughts was so severe to such an extent that even drought resistant crops such as sorghum and millet provided only meager yields under these climatic conditions. This means that the growing of small grains is not the panacea to food security as far as the climatic conditions might be severe to such an extent that nothing will grow.

As elaborated by the chart below small grains are the list preferred crops as people prefer to grow traditional crops such as maize and groundnuts for food consumption as well as tomatoes and vegetables which are sold along the Nyamapanda Highway and Mbare Musika which allows them to gain access to financial capital. The continued growing of horticulture produce at such a large scale is because one of the most important livelihoods strategies for the households in Chiwore Ward 16A is market gardening. Despite the fact that the preferred crops are more vulnerable to climate change there seems to be some form of resistance by the rural households in continuing to grow the traditional crops.

As for the growing of beans which is a nitrogen fixing plant which could help in the improvement of soil fertility, the researcher noted that more and more households were beginning to appreciate the fact that it was a short seasonal crop which would help in the supplementing of their diet as well as improving food security in the end. However despite the fact that bean crop is a short seasonal crop from the researchers own assessment the crop was not in good condition as shown by its poor state for those who did not have adequate financial resources to purchase fertilizer. Due to the fact that rains were excessive during the 2016-2017 seasons more financial resources were needed for the purchasing of fertilizers as it was being washed away by the excessive rains and in the end stretching the already constrained resources. As such those households which could not afford the fertilizers had no option other than to fold their hands and let nature take its course.

6.2 Livelihoods diversification the panacea to climate change vulnerability

The second objective was to identify the adaptation strategies which were being employed by the households of Chiwore Ward 16A. The researcher noted that livelihoods diversification was being employed by all the households. Livelihood diversification incorporated all the three categories of the livelihood strategies. Depending on the season of the year households would engage in the agricultural livelihoods strategies such as crop production and market gardening, rely on external interventions by relying on food aid as well as perform their own locally initiated livelihood strategies such as barter trade, opening of Flea markets at the local shopping centers as well as engaging in contract labour.

Crop production was a major livelihood strategy which was given the first priority during the rainy season as it would ensure food security. Vegetable gardening as a livelihood strategy was conducted after the harvesting of crops. However some of the families with the social capital

engaged in both crop production and market gardening during the rainy season with proper organization being practices in terms of time allocation. Through the diversification of livelihoods by engaging in farming and non-farming activities, household vulnerability to climate change was reduced. Mubaya (2010) using the Sustainable Livelihoods Approach observed that responses to climate change involve reorganizing agriculture and its related practices rather than switching to non-farming activities. This means that diversification of livelihoods through the engagement of non-farming activities is minimal as households heavily rely on the traditional agricultural livelihoods strategies.

Other adaptation strategies which the households of Chiwore Ward 16A adopted include growing of small grain crops, engaging in conservation agriculture, using drip kits and '*Tsoka Tsoka'*as irrigation tools, formation of partnerships with those with sustainable water sources in their individual gardens, engaging in barter trade, negotiating for rain, harvesting of fodder , growing of short seasoned crops, food aid, migrating, remittances and buying and selling were some of the adaptation strategies which were adopted by the households in Chiwore Ward 16A in response climate change. This shows that not much has changed as far as adaptation to climate change is concerned. This is supported by Bhatasara (2015) who observes that common adaptation strategies suggested for agriculture are optimizing rain-fed crop production, improved short season seed varieties particularly for maize, drought tolerant small grains and efficient use of available moisture irrigation.

The researcher noted that the above cited adaption strategies were being utilized by the rural households. However there was need for the different stakeholders in climate change issues to mobilize resources educate the rural households on the adaptation measures to be adopted taking into cognisance their area of residents. This is supported by Nyabako and Manzungu (2012:36) who point out that if maize production is to be successfully grown in Zimbabwe under the projected climate change conditions, the germplasm that is available to farmers need to be broadened.

6.3 Sustainability of the adaptation strategies

The third objective for the study was to ascertain whether the adaptation strategies which were being adopted by the rural households were sustainable in the face of the ever changing climate. From the research findings the researcher noted that most of the adaptation strategies were brought by the outsiders and as such the local people were reluctant to adopt them. The researcher also

noted that some of the adaptation strategies were just reactionary to the problem at hand and as such could not help much in terms of the long term objective of fully adapting to climate change in its totality. Households would use the methods when faced with a problem and would soon abandon the adaptation strategies with the coming of the rainy season. This is further supported by Gwimbi and Mundonga (2010) who point out that current adaptation strategies by farmers in dealing with the major effects of climate change are largely reactionary, selective and protective and therefore not sustainable in the long term. This is in line with Egyir et al (2015) who observes that adaptation to climate change has been viewed by many as a long term phenomenon in that, when the peasant farmers using the traditional techniques of agricultural production notice that the climate has altered, they need time to identify potentially useful adaptations, learn, organize the sources and implement them. In the process of adapting to climate change rural households might come up with unsustainable adaptation strategies to which they might not be aware of.

The other factor which also contributed was that of capital. Those with financial capital and social capital were found to be the major beneficiaries of external intervention in terms of the adaption strategies. For instance those with political capital were found to be the main beneficiaries of drip kits which were irrigation tools which would allow one to carry out their agricultural activities without making use of much water. Households which are endowed with the majority of the capital are in a better position to diversify their livelihoods as compared to their counterparts. However access to resources through the possession of political capital was not a guarantee for adaptive capacity as was shown by the crops in the village headman's field. Despite the headman having political, physical and social capital livelihood diversification and adaptation to climate change was not evident. Lack of adequate education had a role to play since some of the households failed to utilize the available capital adequately.

6.3.1 Encroaching on pasture fields

In the event that pasture and harvested fodder was finished and water sources had dried up, households had to encroach on other villages for both pasture and water for their livestock. This is further supported by Osbahr et al (2010) who argue that although adaptation may be effective for one community, it may undermine the ability of others to adapt through spatial spill over's and negative externalities. In addition Murondo et al (2012) point out that crop diversification, conservative agriculture and fodder conservation are creating conflicts that tend to jeopardize the

sustainability of adaptation strategies. Conflicts are more likely to be created over scarce resources as the pasture fields are becoming scarcer by each season. Encroaching on pasture fields is an adaptive strategy in its own right failure to do so will result in household remaining with no livestock of which livestock production is the backbone of the rural livelihoods.

Given the fact that the sustainability context takes into cognisence the needs of the future generations there is need for the adaptation strategies to have long term effects. However from the study findings the researcher observed that the adaptation strategies were short term rather than long term and as such were not sustainable. This is further supported by Mavhura et al (2012) who argue that adaptive strategies appear to be short term measures which are not sustainable. In as much as the adaptation strategies appear to be short term solutions they would have served their purpose and the livestock would have survived and at the end of the day households would have maintained their physical assets.

Whilst other respondents pointed out that they had to dig shallow wells in the river '*mafuku*' which can be destroyed by the animals in the process of drinking water as well as the natural weather patterns such as strong winds. Those households which had to dig shallow wells showed their innovativeness since they had to use the resources within their reach in adapting to climate change. However in as much as shallow wells provide a temporary solution to a long term problem up quickly and sometimes the depth of the well is so deep to such an extent that the livestock will not be able to gain access to the water. Whilst those who have irrigation engines in as much as they argued that they used their engines for pumping of water for their livestock they were also adding on to the problem of carbon emissions.

6.3.2 External interventions and the dependency syndrome

Some form of dependency syndrome was being created through external interventions by the NGOs through the provisions of food aid. Instead of coming up with sound adaptation strategies to climate change some households rely entirely on food aid. Some form of sabotaging was also evident with those who were considered not to be politically correct being sidelined. In as much as the local leaders portrayed a rosy picture about the fair distribution of food aid, politics was somehow involved. Those with political muscles had access to more food rations and as such deemed it unnecessary to go out of their way in diversifying their livelihoods. To them even if the food aid come in small batches they will be the first ones to benefit and as such there is no need to

go out of their way to diversify their livelihood strategies or come up with sustainable adaptation strategies.

From the researchers own analysis the some of the crops which were in the field were showing evidence of negligence due to the dependency on the external interventions by NGOs through the provision of food aid. Therefore the sustainability of food aid as an adaptation strategy in the face of the ever changing climate was a cry for concern. However being politically affiliated and gaining leverage in order to gain access to food aid is an agency in its own right which has been used by rural households.

Practicing conservation agriculture as an adaptation strategy can be argued to have been an over celebrated issue as there is a low uptake of the method. However the uptake of conservation agriculture is still minimal as households were complaining that it was time consuming and laborious as such people had to abandon other livelihood strategies. In as much as positive results have been recorded there is need for rural households to be educated on the long term benefits of using conservation agriculture. Proper training had not been given to the households and this has resulted in the abandoning of conservation agriculture as a whole.

6.4 Conclusion

In conclusion the researcher highlights that livelihoods strategies of rural households which are mostly agricultural based have been facing a lot of challenges from the ever changing climate. However because individuals are endowed with agencies as highlighted by the Actor Oriented Approach rural households have managed to come up with various adaptation strategies in the face of the ever increasing climate. However the sustainability of the adaptation strategies is questionable since they have a short time frame and as such they provide short term solutions. Other than that there's need to have a foresight and adopt the use of adaptation strategies so as to ensure that livelihoods strategies of the future generations are protected. The researcher also noted that those with more forms of capital were in a better position to adapt to the negative effects of climate change. They were able to do so because the various forms of capital allowed them to diversify their livelihoods strategies as compared to those who were not endowed with the assets.

Chapter 7: Conclusions

7.0 Introduction

The research was aimed at understanding and analyzing how climate change has affected the rural livelihoods strategies. Identifying the adaptation strategies which are being adopted in the rural areas and the sustainability of the adaptation strategies was also done. From the initial chapters the researcher elaborated on the above mentioned issues. The research concluded that climate change is a major disservice for the rural households since their major livelihoods strategies depend on the natural environment which has been negatively affected by climate change.

7.1 Vulnerability of traditional agricultural livelihoods strategies

The study concludes that, it is traditional agricultural livelihoods strategies which are at the mercy of the natural environment, and are more vulnerable to climate change. The traditional agricultural livelihoods strategies include crop production, livestock production and horticultural production. Declines in crop yields, increased land aridity, degraded vegetation and increased incidences of crop diseases are some of the negative effects on crop production which have resulted from climate change. Poor quality vegetables are being produced due to excessive climatic conditions such as intense heat and this has resulted in the dwindling of the rural households financial assets since the produce will fetch not only a lower price but at times will have to be consumed at the household level.

Whilst on the other hand livestock constitutes physical assets for the rural households, the asset base has been reduced due to climate change. Due to climate change water sources have significantly dried up thus water for both the livestock and crop production is scarce for everyday use by the households. With the depletion of water resources those households which have irrigation equipment especially the water pumping engines have a major advantage over their counterparts who do not have as they are able to have access to water during the dry season for both their crops and livestock.

With poor rains and increased and persistent dry spells there have been poor pastures for the livestock. Due to poor pastures there has been an increase on livestock diseases and an increase in the livestock mortality rate. Livestock reproduction has also been recorded to be on the decrease due to the poor health of the livestock

7.2 Short lived adaptation strategies

From the focus group discussions and the interviews findings the adaptation strategies which were being employed had short term benefits. In as much as households had defied the odds of poverty by coming up with local initiatives in terms of irrigation equipment which would allow them to gain access to natural assets such as water it was a temporary measure. Those with irrigation engines still continued to have relative advantage over their counterparts who use the drip Kit irrigation and *tsoka tsoka*. The growing of small grain crops and short seasonal crops which have been cited by various scholars as the effective adaptation strategies are facing stiff resistance. This then means that there is need for the responsible government institutions to educate the rural inhabitants on the benefits of growing small grain crops and short seasonal crops as well as provide solutions to the problems which were being cited on growing these crops. Without the construction and rehabilitation of the proper structures the effectiveness of adaptation strategies will remain a dream.

7.3 Understanding adaptation using the sustainable livelihoods approach a

The two approaches that is the sustainable livelihoods approach and the actor oriented approach were used in the understanding of the adaptation strategies which are being adopted by the rural household. The Sustainable Livelihoods Approach acknowledges that the rural households have different forms of capitals which they can utilize in adapting to climate change. In as much as there's an acknowledgement that not all households possess all forms of capitals, households have been able to utilize and sometimes borrow capitals in engaging in their livelihoods strategies.

7.4 Understanding adaptation strategies using the Actor oriented approach

In as much access to various forms of capitals is provides a leverage in terms of having better adaptation strategies rural households have managed to come up with their own initiatives in responding to climate change despite their lack of resources. Whilst those with irrigation engines are can draw water from various sources at the expense others, those without the resources have been found to be using their agencies in coming up with other forms of irrigation equipment using the locally available material.

7.5 Concluding remarks

Climate change has affected every facet of the rural households. Traditional agricultural livelihood strategies are more vulnerable to climate change since they rely more on the natural environment. However because individuals are endowed with agencies rural households have managed to come

up with various adaptation strategies so as to ensure food security and the maintenance of the physical asserts in the case of livestock. Irrigation equipment has been diversified by the rural households especially those with limited financial resources, making use of the locally available materials in the process. However the sustainability of the adaptation strategies is questionable as they seem to have short term effects as such there's need for government intervention on the adaptation strategies.

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Appendix A

Guidelines for focus group discussion

Name of Village and Ward

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1. What are your main livelihood strategies?
2. During which time of the year do you carry out your livelihood strategies
3. Where do you get your water for both livestock and human consumption?
4. How far do you travel to the nearest water source?
5. Do your water sources provide you with water for the whole year?
6. In the event that the water sources dry up, what are your alternative water sources?
7. Have you noticed any changes in the climate in the past five years?
8. In what way has the changes in climate affected your livelihood strategies which rely on the natural environment?
9. What adaptation strategies have you been employing in response to climate change?
10. Have you suffered any livestock loss in the past five years an what has been the cause of the livestock loss?
11. What changes have you made to your livelihood strategies in orer to adapt to the changing climate?
12. Are the adaptation strategies that are being employed by various households sustainable?
13. What do you think should be one by various stakeholders to combat climate change?

Appendx B

Semi structure Interview guide for household leaders

Name of village

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1. Gender of responent
2. Marital status
3. Age of respondent
4. Highest level of education attained
5. Household size
6. How many males? How many females?
7. Main source of income for the household
8. Other sources of income for the household.
9. Number of meals taken per day
10. Do you have any livestock ? If yo do how many of each do you have?
11. Distance travelled to the nearest water source for both human consumption and livestock
12. What kind of livelihoo strategies are you involved in?
13. Are the livelihood strategies seaosonal or all year round?
14. In what way has climate change affected your livelihood strategies?
15. Have you suffered any livestock losses? If so what were the causes for the deaths?
16. In what ways have you tried to ease the livestock losses?
17. What copying strategies have you been employing with regards to climate change?
18. Is there any institutional support from the government, NGO's an others in copying with climate change?
19. What o you think should be done to effectively combat climate change?
20. Do you think your granchildren will be able to survive on the same livelihoos strategies?

Appendix C

Key informant interview guide

1. Gender of repondent
2. Marital status
3. Age of respondent
4. Highest level of education attained
5. Period of stay in the district
6. What are the major livelihood strategies for households in Chiwore Ward 16A?
7. In what way are the livlihood strategies affected by climate change?
8. Are there any adaptation strategies to climate change by households in Chiwore Ward 16A?
9. As an Agritex officer what role have you played with regards to combatting climate change?
10. Are there any active NGO's helping with adapting to climate change?
11. How sustainable are the adaptation strategies which are employed by the households?
12. What are your suggestions with regard to combatting climate change?