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FACULTY OF ARTS

DEPARTMENT OF DEVELOPMENT STUDIES

*IMPACT OF CLIMATE CHANGE ON RURAL PEASANT FARMING; A CASE OF GURUVE,
ZIMBABWE*

BY

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Tinashe Maraya

Date

DEDICATIONS

This is dedicated to my late mother Mrs M Maraya and my father Mr CT Maraya

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Firstly I would like to thank the Lord Almighty who protected me throughout the entire course and made it possible for me to have fruitful academic years. It would have not been possible without his grace and love. My heartfelt thanks to my supervisor Dr J Matunhu who gave me profound advice for the completion of this document and all my lecturers for sharpening me to be who I am today. I extend my deepest gratitude towards my family my father, Tawanda, Peter, Tinotenda, Terry, Tapiwa. Lastly special thanks goes to my friends Nyaradzai, Anesu, Nyasha, Forgiveness, Andy, Thandiwe and Kudzayi. I would not have done it without you I greatly appreciate your love and support.

God bless you all.

ACRONYMS AND ABBREVIATIONS

CO ₂	Carbon dioxide
CC	Climate Change
EMA	Environmental Management Authority
FAO	Food and Agriculture Organisation
GHGs	Green House Gases
IKS	Indigenous Knowledge Systems
IPCC	Intergovernmental Panel on Climate Change
NGO	Non-Governmental Organizations
RDC	Rural District Council
RPF	Rural Peasant Farming
UNDP	United Nations Development Program
UNFCC	United Nations Framework Convention on Climate Change

ABSTRACT

Climate change is a topical issue which has captured many researchers attention recently. The research was carried out in the Guruve Rural District Council in Mashonaland province. The researcher wanted to know and fully understand how climate change has affected farmers in this area. The researcher used the qualitative research method were she made use of questionnaire and interviews from the findings, the researcher found out that climate change has brought about many effects on rural peasant farming some of these being water scarcity, immature crop yields and loss of livestock and health complications. Farmers have already started to note differences and have started to implement adaptation measures such as conservation farming, water harvesting and the cultivating of small grain crops.

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CHAPTER ONE

PROBLEM AND ITS SETTING

1.0 Introduction

Climate change is affecting all countries in the world. Extreme weather conditions like drought and floods have become more intense and more frequent, with far reaching destructive effects on the livelihoods of people, especially those in developing countries and more so those in climate sensitive economic activities like agriculture. All categories of agricultural workers are therefore affected. The livelihood of rural peasant farmers in worldwide is being threatened by extreme climatic conditions that are leading to droughts and floods. These of course mean immense toll in the livelihoods of families, especially those in the rural areas. Global climate change is one of the most critical challenges facing the international community today.

Decades of hard work and development efforts and initiatives is being threatened by climate change and its negative impacts on agriculture, health, environment, roads, and buildings especially in developing countries (GoU 2007; IPCC 2007; Mendelsohn et al 2006; Stern 2007). From a food security perspective, sub-Saharan Africa (SSA) is one of the most affected regions due to its over reliance on rain fed agriculture (Dixon et al 2001; Cooper et al 2008). Climate change has recently become a huge global concern posing many threats in most economic sectors around the world.

Zimbabwe is a landlocked country in southern Africa, lying between latitudes 15° and 23° south of the Equator and longitudes 25° and 34° east of the Greenwich Meridian. Its area is 390,757 square kilometres. The country is bordered by Mozambique to the East, South Africa to the South, Botswana to the West and Zambia to the North and North-west. The Zambezi River to the north

and the Limpopo River to the south, form Zimbabwe's borders with Zambia and South Africa, respectively. The country has a sub-tropical climate with four seasons; cool season from mid-May to August, hot season from September to mid-November, the main rainy season running from mid-November to mid-March and the post rainy season from mid-March to mid-May. The mean monthly temperature varies from 15°C in July to 24°C in November whereas the mean annual temperature varies from 18°C on the Highveld to 23°C in the Lowveld. The lowest minimum temperatures (7°C) are recorded in June or July and the highest maximum temperatures (29°C) in October, or if the rains are delayed, in November FEWSNET 2012.

Guruve is one of the seven districts found in the Mashonaland central province in Zimbabwe with the centre being the growth point of Guruve centre. It has a total population of about 20,833 (Zimstat 2012). The Korekore people are the native people of the District. The traditional chiefs and spirit mediums are considered important people in the community and play an important role in socio-political orientation they have also played a very important role in coming up with coping strategies resulting from the impact of climate change (Zimbabwe Election Support Network 2008). Guruve is a relatively big district and most of its population depends entirely on peasant farming; the most farmed crops are maize, beans, and soya beans.

Many rural dwellers practice small scale farming to put food on the table and also in some cases to even provide for family and relatives that stay in urban area. Efforts of these small scale farmers are being weakened by effects of climate change. Recent reports produced by the Intergovernmental Panel on Climate Change (IPCC) (2001, 2007, 2012) conclude not only that green-house gas emissions are already beginning to change the global climates. Reports also showed that Africa will experience increased water scarcity, poor yields particularly those that depend on rainfall that will lead to increased food insecurity and malnutrition, sea-level rise and

this in other cases will cause floods. Extreme weather events, notably flood, drought and tropical storms are also expected to increase in frequency and intensity across the continent (IPCC, 2007). These projections are consistent with recent climatic trends in southern Africa, including Zimbabwe. The effects of this vulnerability to this changing climate is exacerbated by the social and ecological systems in the region, and the limited capacity of civil society, private sector and government actors to respond appropriately to these emerging threats.

Recent reports produced by the Intergovernmental Panel on Climate Change (IPCC) (2001, 2007, 2012) conclude not only that green-house gas emissions are already beginning to change the global climate, but also that Africa will experience increased water stress, decreased yields from rain-fed agriculture, increased food insecurity and malnutrition, sea- level rise, and an increase in arid and semi-arid land as a result of this process.. The effects of this exposure to changes in climate are exacerbated by the social and ecological systems in the region, and the limited capacity of civil society, private sector and government actors to respond appropriately to these emerging threats.

1.2 Statement of the Problem

The biggest problem facing farmers in Guruve is how to adapt and mitigate the effects of climate change. Rural peasant farming is very crucial in their livelihood as it is the major economic activity they engage in. It is also how they ensure food security in their families and also to send to their family members that are in urban areas. So cc is not the only problem these farmers are facing but also how to adapt and mitigate the effects is the major problem, as there is need for these measures to be very sustainable.

1.3 Objectives

- To examine how rural peasant farming is being carried out in Guruve

- To assess the perception of rural peasant farmers on the effects of climate change on their agricultural practices
- To assess the usefulness of the adaptation strategies put in place to mitigate the effects of climate change

1.4 Research Questions

- 1) For how long have you been engaged in rural peasant farming?
- 2) What changes have you noticed about temperatures and rainfall lately?
- 3) What has the government and other stakeholders done in relation to climate?

1.5 Definition of terms

1.5.1 Climate change: CC is defined as notable shifts of the usual climate that is highly noticeable (for example by using statistical tests) by changes in the mean and /or the variability of its properties, that goes on for a long period of time in some cases decades or longer IPCC 2007 it also refers to the long term change of the earth's climate especially a change to an increase in the average atmosphere temperature. It is therefore a long term shift of patterns in specific regions or globally.

1.5.2 Rural peasant farming: Peasant farming is the phrase that has been used to describe small scale farming for subsistence and also for cash sale in the market. Initially small holder farmers produce crops for domestic use as well as for sale. It also includes the rearing of animals. 'Peasant' is a word used to describe the impoverished farmers in the fifteenth century however it is now a derogatory term used to describe people who produce food from the land using traditional farming

methods that does not include heavy machineries and who comprise on agricultural class and depend on subsistence (Dixon, Abur&Watterbach2005).

1.5.3 Climate change impacts: The effects of climate change on natural and human systems (IPCC 2007).

1.5.4 Vulnerability: The degree to which a system is exposed to and unable to cope with adverse effects of CC including climate vulnerability and extremes, vulnerability is a matter of analyzing the magnitude and rate of CC and variation to which a system is exposed (IPCC 2007).

1.5.5 Adaptation: Processes were communities prepare and adjust themselves to cope with an unpredictable future which requires to take appropriate action, making adjustments and to reduce the negative effects of climate change (UNFCCC, 2007).

1.6 Significance of study

The research was of great value to the student mainly because it improved the student's research skills. Also, the research will be of significance to the University because it will provide literature to the future researchers who would also want to research on the subject of agriculture and climate change in Zimbabwe. It is also of great importance as it provides the concerned stakeholders such as NGOs, government and the farmers themselves research on their work and the research also leaves room for adoption of some recommendations for further sustainable agriculture initiatives. Thus this research will bring new knowledge and insight to the controversial topic surrounding climate change and how it has impacted rural agriculture. The study will also look at the adaptation measures put in place by the farmers and how effective they are. The study will be very significant as the student will also give practical recommendations that can be put in place by the farmers.

1.7 Justification of Study

The study was motivated by the need to explore the plight of rural peasant farmers in the area of Guruve in facing the adversity of climate change which has become a global concern. The study implies that climate change is now inevitable and people need to be taught from a local level to find and implement ways for survival. The study took a very close look on how the farmers are being affected by climate change and the usefulness of the ways they are putting in place to mitigate the effects of climate change, strategies brought about by stakeholders such as the government and NGOs research will be very useful to the local farmers in Guruve and also other stakeholders in the agriculture sector.

1.8 Limitations

The researcher might find a number of challenges in carrying out her research some of the challenges being lack of inadequate funding for transport to visit as many farmers as possible for an improved quality of research.

1.9 Delimitations

This refers to the geographical location of where the study is being carried out. This research was carried out in Guruve. Guruve is one of the seven districts found in the Mashonaland central province in Zimbabwe with the centre being the growth point of Guruve centre. It has a total population of about 20,833. Guruve is the home to the Korekore people, comprises Bakasa, Kazungu, Kachuta and Guruve centre. It is a rural setup and the researcher will analyse the agricultural practices in Guruve and how they are being affected by climate change.

1.10 Theoretical framework

The research is based on the theory of sustainable development. Sustainable development is a well-known guiding principle that has been used ever since weakening environmental conditions in many parts of the world, World Commission on Environment and Development (WCED, 1987).. Sustainable development has been defined as development that meets the cultural, social, political and economic needs of the present generation without compromising the ability of future generations to meet their own needs. The major idea behind sustainable development is to use the available resources for the present generation while at the same time being conservative and cautious so as to preserve the resources for the future generation. Sustainable development looks at environmental, economic, social, political as well as psychological aspects. Sustainable development is defined by the Brundtland Commission (1987) as development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.

This theory stipulates that the relationship between the environment and development is inextricably linked. So in light of this research it is imperative to note that agriculture and environment are two things that are inextricably linked and cannot be separated. This is so because if the environment is well looked after it means that agriculture is more productive. This theory also comes in very handy when it comes to the adaptation strategies that are put in place by farmers in trying to adapt to climate change, it is important to value the sustainability of these measures and also see to it that they promote sustainable development. Sustainable development can also reduce vulnerability to climate change. This theory is very important in analyzing the strategies that farmers are putting in place in trying to mitigate effects of cc. It is imperative for the researcher to examine if these strategies are not undermining sustainable development. Some farming activities and inputs pose a threat to the environment. Inputs like cow dung and fertilizers have

proved that they produce methane gases that are also causes of CC, so farmers in a bid to produce good yields they use other inputs which can actually cause more harm than good in the long run so it is imperative to use the sustainable development approach as a yardstick for this research.

Lately in a bid to reduce poverty farmers have resorted to cutting down of trees and sell them as a means of survival, deforestation is one of the major causes or drivers of cc and one can note that this does not uphold sustainable development. There are also other practices that undermine sustainable development by deteriorating the environment such as veld fires. Farmers in the Guruve RDC have used veld fires as a way of clearing the land.

In a bid to promote sustainable development local authorities have worked together with other important stakeholders such as EMA, NGOs and the forestry commission. However the researcher noted that the RDC is not doing much on its own to try and come up with strategies that bring about sustainable development.

Chapter breakdown

Chapter one comprises of the introduction to this research. It consists of the problem and its setting the background to the study, theoretical framework, limitation and delimitations of the study, justification and significance of the study. Chapter two is review of relevant literature concerning the study. Chapter three shows the research methodology that the researcher used in carrying out the research, chapter four presents and analyses data that was obtained from the field. Chapter five is the concluding chapter, where the researcher concludes her research and gives recommendations.

Chapter summary

In summary the breakdown of the research on the impact of climate change on rural peasant farming in the district of Guruve and from the above one can note that climate change has a very negative impact on rural peasant farming and full details are going to be reviewed in the next chapter.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The following chapter is going to look at the debates surrounding climate change rural peasant farming. The chapter will also look at how climate change is affecting development on a broad basis. It is also in this chapter that the researcher will conceptualize the issue of climate change and the impact it has on agriculture particularly small scale farming in rural communities. In this chapter the researcher is also going to give subtopics that will help understand more the impact of climate change on rural agriculture. The researcher formulated a few sub topics to help understand the sub topics are causes of cc, evidence of cc, characteristics of rpf, effects of cc on rpf in other countries and in Zimbabwe, coping strategies that farmers are putting in place to mitigate the effects of cc.

2.1 Causes of climate change

Climate change is defined as a shift of climatic conditions over a long period of time, with values of climatic elements changing significantly. Climate change has captured many researchers' attention recently as it has become a trending topic affecting many spheres of life. The major drivers of climate change are naturally occurring greenhouse gases (GHG) such as carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and ozone (O₃) are present in the atmosphere and are responsible for keeping the temperature on Earth at optimal levels to support life. In the pursuit of attaining development through the industrialization human beings contribute immensely to the accelerated accumulation of GHG in the atmosphere: carbon dioxide is released when forests are cut and burned to give way to commercial and subsistence farming and when fossil fuels are burned to generate energy and power to support industries; methane and nitrous oxides are released into the air by various agricultural activities and changes in land use; artificial chemicals called halocarbons (HFC, PFC and CFC).

2.2 Evidence of Climate

Climatologists have given evidence to support that the climate is changing. Evidence of climatic change taken from a variety of sources clearly shows how much things have changed from the past. Mostly CC evidence is derived from changes in key climate indicators; these include vegetation, ice cores, dendrochronology, sea-level change, and glacial geology IPCC 2013. Climatologists around the world have indicated that long term changes in temperature and precipitation and increases in climate variability and extreme weather-related events are already evident in many parts of the world.

Scientific evidence shows that mean annual temperature has increased; and it is expected to further increase at a rate of 0.05°C per decade, while rainfall has been erratic, decreasing on average at a rate of 5 to 10% per annum, with annual anomalies mostly below normal (Hulme et al ,2000) and other gases are released by industrial processes; ozone in the atmosphere is generated by automobile exhaust fumes and other sources (UNEP and UNFCCC 2002).The greenhouse effects' major drivers are the accumulation of GHG in the atmosphere: the retention on of heat energy inside the Earth's atmosphere, trapping heat inside the atmosphere instead of releasing it back into space. Higher concentration of GHG results in higher percentage of trapped heat. This phenomenon causes the increase in global temperature, also known as global warming, which in turn causes undefined variation and changes in temperature and rainfall and extreme climate events, better known as climate change.

2.3 Characteristics of Rural Peasant Farming

Rural peasant farming is small scale farming for subsistence as well as for cash sale in the market. Scholars define RPF in various ways depending on context, country and ecological zone. This

explains interchangeable use of the term ‘smallholder’ with ‘small-scale’, ‘resource poor’ and ‘peasant farmer’. Dixon, Abur & Watterbach (2005) explain that the term smallholder only refers to their limited resource endowment relative to other farmers in the sector.

Smallholder farmers are farm households that base their livelihoods in land relying primarily on family labour for farm production to produce for self-subsistence and often for market sale. In addition, Todaro (1989) defines RPF as owning small-based plots of land on which they grow subsistence crops and one or two cash crops relying almost exclusively on family labour. These definitions have a similar theme in the characteristics of smallholder farmers, namely constraints in land and labour. The National Department of Agriculture (NDA, 2005) suggests that the major characteristics of production systems of smallholder farmers are of simple, outdated technologies, low returns, high seasonal labour fluctuations and women playing a vital role in production. In addition, Dixon et al (2005) suggests that most smallholders have diverse sources of livelihood including significant off-farm income yet are still vulnerable to economic and climatic shocks. Smallholder farmers have their differences in individual characteristics, farm sizes, resource distribution between food and cash crops, livestock and off-farm activities, their use of external inputs and hired labour, the proportion of food crops sold and household expenditure patterns.

2.4 The effects of climate change on rural peasant farming in other countries

RPF's dependence on optimal temperature and water availability makes climate change a critical factor affecting the productivity of good yields at the end of the season. CC has become a global concern worldwide. Many researchers and authors have come up with various explanations on

how climate change affects rural peasant farmers in various countries, as highlighted above this topic is going to explore what other scholars have said concerning the issues surrounding climate change and rural peasant farming from a global point of view and the researcher will then narrow it down to the area of study for this research (Guruve). The researcher will also try and fill the research gaps that scholars left and also the research will outline her point of view regarding the issue of climate change and the impact it has on rural small holder farming.

In the Philippines farmers are already reporting a number of climate change related abnormalities these include a rampant increase in pests that are destroying crops, unpredictable rainfall and temperatures that have led to flower abortion in fruit trees and also immature fruits. In some parts of Asia, about 2.5% to 10% decrease in crop yield has been already noted. Intensification of agriculture has been the means to meet the food requirements of Asia, but it is most likely to be invariably affected by projected climate change (Cruz et al 2007). The IPCC states that smallholder and subsistence farmers in developing countries are among those who will be affected the most from CC impacts (Easterling et al. 2007).

Major cereal crops such as rice and maize are now experiencing declining production potential due to heat and water stress (ADB 2009a). For instance, a study at the International Rice Research Institute (IRRI) shows that rice yields declined by 10% for every 1°C increase in mean night-time temperature. Increased rate of evaporation and transpiration caused by higher surface temperature has compromised the availability and quality of water for agricultural and industrial use, as well as human consumption (ADB 2009a). Global warming would cause an increase in rainfall in some areas, which would lead to an increase of atmospheric humidity and the duration of the wet seasons.

Combined with higher temperatures, these create a conducive atmosphere for the development of fungal diseases. Similarly, because of higher temperatures and humidity, there could be increased pressure from insects and disease vectors. Reduction of crop yields due to crop damage and crop failure, water logging of soils due to increased rainfall and flooding, increased livestock disease and mortality of irrigation water can all be expected to affect the activities and productivity of smallholder farms (IPCC 2007c).

Ethiopia is one of the examples of how climate change affects Africa (Haakansson, 2009). Based on UNDP (2007/2008) human development report, 46% of the population in Ethiopia is malnourished and 77.8% of the population earns less than two US dollars a day. Moreover, The World Bank (2012), pointed out that Ethiopia is one of the countries in Africa that is extremely vulnerable to drought and natural disasters such as flood, heavy rain, frost and heat waves.

Konsowereda is one of the special areas in the region, reputable agricultural practices for instance, mixed cropping and agro forestry and a long lasting terracing agriculture system nowadays, and the impact of the global climate change has totally changed the environmental and agricultural status of some places. Since 1970's in the special *Wereda Konso* things are changed. Even though, the Konso people are known to be hardworking, due to the socio economic, environmental, institutional change and demographic pressure, their historical and traditional method of natural resource conservation and land management face difficulty in trying to deal with CC

According to UNDP rapid assessment report (1999), famines continue to hit Konso almost once every ten years. Konso was devastated by drought starting from 1973/ 74 and 1983/84 and things had not changed in 2007/2008. Nowadays, farmers start to develop dependency syndrome as they are now depending entirely on food aid to support their family and they see some possibility to

get some money from NGO's working in the area. It is important to note that CC is a process that takes time and climatologist have pointed out that in some cases it takes about thirty years so one can note that in this instance the Konso people started to note evidence of climate change about thirty years ago, which goes on to support the argument that has been brought about by other scholars who have come up with a concept that climate is constantly changing.

Malawi is an already severely poor country facing an AIDS pandemic, chronic malnutrition, declining soil fertility, shortages of land and inadequate agricultural policies. About 6.3 million Malawians live below the poverty line, the majority in rural areas, with more than 90% relying on rain-fed subsistence farming to survive.

Evidence brought forward shows that that due to the ever increasing droughts and floods of poverty is also exacerbating, leaving many rural farmers trapped in a cycle of poverty and vulnerability. The situation in Malawi illustrates the drastic increases in hunger and food insecurity being a result of global warming. Disasters have continued to escalate, with the 2002 drought and flood that created landmark food crisis that will never be forgotten in Malawian history. Since then, the country is facing a huge challenge of food insecurity caused by erratic rains and regular floods. Changes in rainfall have resulted in changes in the growing seasons as well as in crops grown. For example, maize used to be grown in November, but it is now being grown in December clearly, farmers are now uncertain of when to plant. Farmers have now switched to short-season hybrid maize varieties because the growing season is shorter. Rainfall patterns have hindered the growing of long-season local indigenous maize varieties.

There has also been a noticeable increase in diseases such as malaria, cholera and dysentery associated with changes in rainfall patterns, and this has created health challenges that are

particularly affecting women. Sub-Saharan Africa is especially vulnerable to these climatic changes and to the resulting agricultural production response. According to projections, CC impacts on sub-Saharan Africa are considerable; even a 1° C to 2° C warming would lead to high yield losses in arid and semi-arid areas (30-50% by 2050). Projections related to climate change are subject to huge uncertainties especially for smaller geographical areas, so effects may vary by region.

2.5 Effects of CC on Rural Peasant Farming in Zimbabwe

Zimbabwe has a sub-tropical climate with four seasons; cool season from mid-May to August, hot season from September to mid-November, the main rainy season running from mid-November to mid-March and the post rainy season from mid-March to mid-May. The mean monthly temperature varies from 15oC in July to 24oC in November whereas the mean annual temperature varies from 18oC on the Highveld to 23oC in the low veld. The lowest minimum temperatures (7oC) are recorded in June or July and the highest maximum temperatures (29oC) in October, or if the rains are delayed, in November. The climate is moderated by the altitude with the Eastern Highlands enjoying cooler temperature compared to the low lying areas of the low veld.

Zimbabwe is generally a semi-arid country with low annual rainfall reliability. The average annual rainfall is 650 mm but geographically it ranges from around 350 to 450 mm per year in the Southern Lowveld to 1,000 mm per year in the Eastern Highlands. The rainfall pattern of Zimbabwe is variable with years below and above normal rainfall Zimbabwe National Climate Response Strategy May 2013. Zimbabwe recently has been experiencing a warming trend towards the end of the twentieth century compared to the beginning, with the annual-mean temperature increasing by about 0.4 oC since 1900. The 1990s decade has been the warmest during the last

century. This warming has been noted by climatologist to be rather high during the dry season. Day-time temperatures have warmed more than night-time temperatures during the wet season. There has been an increase in both the minimum and maximum temperatures over Zimbabwe.

Zimbabwe's continental interior location means that it is predicted to warm more rapidly in the future than the global average. These climatic conditions have made noticeable impacts on agriculture in Zimbabwe, and the researcher is going to look at how exactly agriculture has been affected by climate change in Zimbabwe. Zimbabwe's agricultural sector supports household and national food self-sufficiency, being the source of raw materials for industry, and reducing negative pressure on the environment. Over 70 per cent of Zimbabwe's employment is directly or indirectly accounted for by agriculture, yet the majority of farmers lack access to available technologies and markets.

The national agricultural production largely relies on rain-fed agriculture, and this makes agriculture one of the most vulnerable sectors to climate change and variability. Zimbabwe has not utilized the scientific and technologies to increase and improve productivity; stimulate industrial growth and participate in regional and global markets to support diversified livelihood options for the different categories of its people. Zimbabwe has actively participated in international negotiations on climate change from as far back as 1992. It was among the first countries to sign and ratify the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and also ratified the Kyoto Protocol in 2009.

The increase in erratic rainfall seasons, accompanied by unpredictable lengths of seasons; high temperatures; alternating floods and dry spells; and variable rainfall amounts, has brought about new challenges to the majority of farmers integrated response strategies are, therefore, required

across the different development sectors if the current and future climate threats are to be addressed.

Agriculture accounts for approximately 15-18 per cent of Zimbabwe's GDP and approximately 60 per cent of the raw materials required by the manufacturing industry and 40 per cent of total export earnings (GoZ, 2010). Rainfall variability is closely linked with economic growth, which reflects the dominance of the agricultural sector and its vulnerability to water stress. Between 1993 and 2000, average annual maize production stood at 1.64 million tonnes before dropping to 1.08 million tonnes between 2001 and 2008. In addition, the average yield for maize during the 2009-2010 farming season was 0.7 tonnes per hectare, down from 0.85 tonnes per hectare in 2008-2009. In 2007, only 45 per cent of national cereal requirements were produced in the country, leaving a deficit of over 610,000 metric tonnes to be covered by imports (FEWSNET, 2007). Similarly, cattle population declined from approximately 6.1 million in 2000 to 5 million in 2011, while dairy production dropped from over 100,000 cows in 2000 to approximately 22,000 cows in 2010.

Even diversified livelihood systems with a livestock component are expected to become more vulnerable. Mixed crop-livestock systems are a traditional livelihood strategy of smallholder farmers in semi-arid rural areas (Kahinda et al., 2007; Wani et al., 2009). These systems tend to be well adapted to climatic conditions characterized by erratic rainfall patterns. However, climatic variability in semi-arid areas poses major threats to natural processes that sustain fodder production for livestock and moisture for rain-fed crop production (Tadross et al., 2009).

The farmers in Guruve are practicing RPF. The most farmed crops in Guruve are maize, beans, cotton, and soya beans they also engage in animal rearing and the common ones being cows, goats, pigs and hens. People are often surprised about what can be produced on the small plots and

acreages found rural areas. Due to the increasing demand for food and lack of jobs or any viable economic activities that generate income for rural dwellers, it became necessary for rural peasant farmers to embark on small scale farming as a means of filling the food demand and supply gap and providing income for other households' requirements. In addition, the practice of rural peasant agriculture has continued to increase in recent years with the structural adjustment of the Zimbabwean economy around 1986 ZESN 2010. As mentioned before climate change has become a widespread phenomenon that has detrimental and disturbing effects especially on smallholder farmers in rural setups. Like many other farmers across the world farmers in Guruve are also facing the challenges being brought about by climate change. Reduction of crop yields due to crop damage and crop failure immature crops due to erratic rainfall and the unpredictable durations of the rainy seasons.

2.6 Adaptation

Adaptation refers to the process through which societies increase their ability to cope with an uncertain future, which involves taking appropriate action and making the adjustments and changes to reduce the negative impacts of climate change (UNFCCC, 2007). Adaptation to climate change also refers to adjustment in natural or human systems in response to actual or expected climatic changes, which moderates harm or exploits beneficial opportunities (IPCC 2007b). There are many types of adaptation these include anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation IPCC 2009. The ultimate goal of all adaptation is to address climate risks, enhance resilience and reduce vulnerability (GECHS 2008). Adaptation to climate change and variability necessitates the adjustment of a system to moderate the impacts of climate change, to take advantage of new opportunities, and to cope with the consequences (IPCC 2001).

Climate change adaptation is a very complex, multidimensional, and multi-scale process (Bryant et al. 2000). The factors that play a crucial role in cc adaptation diverse and they differ from community to community (Smit, McNabb, and Smithers 1996; Smithers and Smit 1997; Burton, 1997; Bryant et al. 2000; Smit and Skinner 2002; Agrawal and Perrin 2008; Heltberg, Siegel, and Jorgensen 2009). Research has shown that climate change adaptation cannot be applied universally as there are various factors that determine how it is applicable such factors include the community's vulnerability, the institutional capacity of the community.

Institutional capacity simply means degree of social capital in the community, the ability of community members to work collectively, and their ability to access resources and information from higher-level institutions such as government agencies and nongovernmental organizations (NGOs). Many factors, such as the characteristics of the community or group (for example, size, degree of homogeneity, and so on), the ways in which members of the community organize (group type), and the linkages with higher level institutions (for example, with supporting government or donor agencies), influence the effectiveness of collective efforts to adapt to climate change (Ostrom 1990; Rasmussen and Meinzen-Dick 1995; Tompkins and Adger 2004).

The differences in our communities there are also different approaches used to adapt to climate change for example in Burundi climate change adaptation strategies adopted in there cover agriculture, livestock, forestry, and energy. Burundi's agriculture sector has adopted these adaptation strategies: Growing crops most sensitive to fungal diseases during seasons with low rainfall or even dry seasons; growing crops resistant to diseases and plant pests during seasons with heavy rain. Growing crops such as cowpeas, pigeon peas, and groundnuts in some areas to supplement the protein-leguminous plants whose production is in continuous reduction. When it comes to livestock the residents in Burundi have adopted a culture where they graze their herds

along the river banks for greener pastures. When it comes to Burundi's forestry adaptation strategies include traditional methods of conserving natural forest ecosystems. This involves respecting, in a quasi-religious way, certain ecosystems and/or elements of both animal and plant biodiversity. For instance, the cutting of trees in the Kibira forest was strictly banned. This high-altitude forest was regarded as a —symbol of the alliance between the Sky and the Earth. This traditional conservation also extends to certain thickets that are considered sacred.

There are times when farmers just make their own independent adjustments without the consent of local authorities for example when a farmer decides to change planting schedules due to change in rainfall pattern these decisions are known as autonomous adaptation. There are however decisions and policies that are introduced and enforced by local authorities such decisions such as the planting of crop resistant plants that have gone through research organization. The major aims of climate change adaptation are to reduce vulnerability and build resilience to the impacts brought by climate change (Brooks and Adger 2005).

Chapter summary

The above chapter looked at the literature review surrounding two major themes CC and RPF. It also looked at how it is being addressed in other communities and how others are adapting to the situation. It also highlights how the sustainable theory is the best theory in explaining issues regarding CC and RPF as they are closely linked to the environment

CHAPTER THREE

RESEARCH METHODOLOGY

1.0 Introduction

This chapter looks at the way the researcher carried out her research, it will elaborate on the research techniques. In this study the researcher used qualitative research after an in-depth studying on research methods the researcher decided to use the qualitative method through the use of questionnaires, interviews and observations. This chapter will give an evaluation of the data collection tools used and their usefulness.

3.1 Research design

Strauss and Corbin (1990) describe qualitative research as that research that produces findings without the use of statistical means. This type of research is the one which is usually used when researching about people's lives, stories, behaviours and social movements. So the researcher used

this type of research as it the best method of research when it comes to describing day to day activities in people's lives. According to Creswell (1998), qualitative research provides a rich source of information leading to theories, patterns or policies that help to explain and inform the phenomenon under study

3.2 Population

Qualitative research method involves a population study and population refers to all individuals, units, objects or events that will be considered in a research study. Best and Khan (2006) defines population as any particular group of individuals or objects that possess one or more characteristics in common which are significant to the researcher .population study is very important as it shows the population group that was targeted by the research . In this particular research the specific target group was rural peasant farmers in Guruve. Guruve has a total population of about 200,833 with agriculture being the main activity that sustains their livelihoods.

3.3 Sample

Leedy (1993) defines a sample as a small proportion of the population from which one is doing the research that is of great importance to the study. In simpler terms sample refers to a smaller group of population selected from the study population. Sample simply refers to a small group that represents the total population group this is usually done due to financial and time constraints. So in this instance the researcher is not going to obtain information from all farmers in Guruve but will select a few that will represent the total population of the farmers in Guruve in this case the researcher obtained her sample from two wards in the Guruve rural district to represent all the farmers in Guruve.

3.4 Data Gathering Instruments

Makore, (2001) postulates that data collection instruments are tools used to collect data needed to find the solutions to problems under investigation. Research instruments are a means of media used by researchers to elicit information from respondents and therefore these all together are tools used to access gather information or data for any particular study Lahey (2010). The researcher used questionnaires, interviews, observations, secondary data collection and oral data.

3.5 Questionnaire

A questionnaire is one of the most used instruments when it comes to researching. It has been described as an inquiry, which has systematic, compiled and organized series of questions that are sent to the population samples (Chiromo 2011) .It is of great importance that a questionnaire is short and straight to the point to avoid confusing and boring the respondents. So the questionnaire that was used in this research was constructed by the student who emailed it to the supervisor who then corrected it. The questionnaire used in this study had good questions, evoked the truth, accommodated all possible answers and it also had no unfamiliar words or abbreviations. The student ensured that those who were issued questionnaires were confidential and remained anonymous.

3.6 Interviews

Interviews according to are purposive discussions that allow the respondents to express their views in their own terms and the outcome tended to be reliable and comparable data. Interviews are very useful as they help get authentic feelings and views of the story behind the participant's experience. An interview requires the actual physical proximity of two or more persons and generally requires that all norms of communication be open to them. There are two types of interviews the structured and the non-structured. The researcher used the structured type of interview. This consists of a list of specific questions and the interviewer must not deviate from the list. The researcher used this type of interview so that the interviewee does not deviate from the questions that wanted clarification and the questions that helped the researcher build her argument.

The interviewees were picked according to the specific contribution they give to study and also the knowledge they possess towards climate change and rural peasant farming issues. The researcher used this instrument of research to the projects manager from LGDA and field officer from SAT, field officer from Agritex and a local headman. The student had to make an appointment with these people they agreed to spare their time to shed more light on the research, the researcher produced an approval letter from the university that allowed the student to obtain information from the above mentioned organizations.

To ensure quality information the researcher took some time to study how to carry out an interview where she learnt that there are certain things one should consider some of these include choosing a place with little distraction, describe the project or research to the interviewee and make sure that the consent from the interviewee is obtained then proceed with the interview. The student took notes as the interviewee responded to her questions this was done so as not to miss important information and try to gather everything the interviewee said.

3.7 Oral data

This is a secondary way of collecting data .Many cultures and areas are primarily oral rather than literary. Just talking to people informally is an ideal way of understanding more and getting more information on a particular research and the researcher intends on doing also that. Listening to stories people tell, informal conversations while people are going about their business can be more informative than a formal group interview.

3.8 Secondary data collection

This data collection method is a way of collecting data from sources like books, internet, and journals it is a way of gathering information from the existing resources. Internal desktop research was used by the researcher. This type of research is widely informative; less costly. This method was widely used by the researcher as she made use of the internet, emails, field visits. This clearly helped the student in complimenting the information respondents might have forgotten during the interview process. Therefore this method was very useful and very much informative.

Chapter summary

The above chapter looked at how the researcher carried out her research. It looked at the research methodology used and also it explained the research instruments that were used in carrying out this research and their effectiveness. The chapter also further explained why the researcher used the qualitative method of research.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND DISCUSSION

2.0 Introduction

This chapter focuses on data presentation, feedback of the findings that the researcher found. It will also analyse the data that the researcher. The researcher took note of the emerging themes, actions, practices and transcript these into meaning. This chapter will determine whether the research was a success or not and most importantly if the objectives of the research were accomplished. So in order to analyse the data the researcher will first look at the objectives and see if they were archived.

4.1 Information Regarding the Sample Population

Fifteen questionnaires were administered to the 15 respondents who constituted the target population in Guruve Rural District. The researcher had ample time to administer the questionnaires and this enhanced the answering of all the questionnaires. As a measure to improve

reliability and validity of the data, interviews were used so as to complement the questionnaire. The researcher conducted was fortunate enough to interview four key informants, one councillor, an Agritex officer, a field officer from SAT, projects manager from LGDA and also a head man.

4.2 Examining How Rural Peasant Farming is Being Carried out in Guruve

For the researcher to understand how rural peasant farming is being carried out in Guruve she issued out questionnaires to the farmers. So from the findings she compiled it shows that most farmers in Guruve have been engaged with rural peasant farming for over fifteen years. With only a few who started rural peasant farming in recent years. The main crops that they are cultivating are maize, beans, and cotton. The researcher noted that recently farmers have started cultivating small grain crops such as sorghum, millet and rappoko. Farmers have also recently adopted the growing of potatoes. Most of these farmers have small but many farms that are allocated to them by the village head man. Usually land is allocated to the males' heads of the family so if one requires or needs another field he or she has to go and request to the village head man. Labour is usually from the family members and in some cases there are some who can afford hired labour but this is not usually the case.

The use the traditional means of farming and there is no heavy machinery like irrigations involved they just use the simple tools ploughs hoes and their cattle. The National Department of Agriculture (NDA 2005) suggest that the major characteristics of production systems of smallholder farmers are of simple, outdated technologies, low returns, high seasonal labour fluctuations and women playing a vital role in production. The farmers have livestock they rear animals like cattle, pigs, poultry, goats and sheep. When taking care of the livestock particularly cattle and goats the villagers take turns to look after the herd while others tend to their fields the herd is driven to what

is called the communal grazing land. This is one of the traditional ways used in the Guruve area by farmers to help each other with balancing between tending the fields and taking care of the animals this is known as “zoro “.

The researcher also noted that for every ward there is an Agritex officer that helps farmers with knowledge and skills when it comes to farming and the researcher was fortunate enough to interview two of these officers where they also gave their insight on the way rural peasant farming is being carried out in Guruve. Ms Karise one of the interviewees pointed out that the use of IKs is very common in this community and traditional authorities play a very significant role when it comes to issues surrounding agriculture. When the researcher was assessing how RPF is being carried out in Guruve she noticed that there were farmers who were more vulnerable to the effects of CC than others as others have more fields than others and also the fact that others have a big capacity more than others. The researcher observed that in as much as they have all been affected by climate change some are not affected very much smallholder farmers differ in individual characteristics, farm sizes, resource distribution between food and cash crops, livestock and off-farm activities, their use of external inputs and hired labour, the proportion of food crops sold and household expenditure patterns and this makes their vulnerability different. So after making this observation the researcher noticed that most of the respondents indicated that their yields have decreased over the years especially to the rural most poor but to those that can afford some of the adaptation strategies that will be discussed in the following paragraphs the yields have not decreased drastically.

4.3 Assessing the Perception of Rural Peasant Farmers on the Effects of CC on their Agricultural Practices

Under this objective the researcher put the findings she got from the questionnaire answered by the farmers under sub topics so as to convey a clear meaning to the readers.

4.3.1 Water Scarcity: Water availability is a key component of agricultural productivity and food security from the questionnaire the researcher noted that there is water scarcity and this is mainly due the sharp increases in temperature and decrease in rainfall. According to climate model analyses, the number of people at risk due to water scarcity increases rapidly with rising temperatures towards the second half of the century, with impacts in arid and semi-arid regions expected to be much larger than the global averages suggest (IPCC, 2001; Parry et al., 2001). A number of farmers made reference to emphasize this point using neighbouring rivers for example the Mwembezi river in ward &. Many famers noted that during the rainy season this river used to be very full to such an extent that children sometimes would miss school as the river as it would be extremely dangerous, but now it no longer gets full even during the rainy season. Water scarcity is one of the major challenges facing farmers the student noted that most of the farmers she interviewed had wells in their backyards however this strategy to cope with the changing climate has not been very sustainable as the wells are drying up due to the high temperatures and also short rainy season that is being witnessed.

Usually the wells are used to water home gardens, and for domestic purposes but because the wells are drying up farmers are now using borehole water which is further worsening the situation as the boreholes are now under massive pressure so this is making the borehole water exhausted to such an extent that many boreholes are no longer functional as there are cases were about four villages share the same borehole. Already there are emerging conflicts over boreholes and it is only a matter of time before they erupt as there is now fiction between and amongst villagers over water sources. This leading to water shortage and the most affected being women as fetching water

comes as one of their daily chores so according to the women the researcher issued questionnaire this is making them very vulnerable to abuse as they have to travel a long distance to fetch water very early in the morning or very late after spending the day in the fields. Women farmers also pointed out with great concern that it is even more risky to send children to fetch water particularly the girl child.

4.3.2 Immature Products: One of the major effects of CC is erratic and unpredictable rainfall that often results in having a really short rain season this has led to the production of a poor quality of crops. From the questionnaire the researcher derived that the most affected crop when it comes to the issue of unpredicted rainfall is beans. Farmers pointed out that for one to have a really good grade of beans one has to do a good timing when it comes to rainfall as beans require lots of rain during its plantation up to the point where it starts to flower but when the bean seed starts to develop it requires less water. So back in the day they would plant beans during the peak of the rainy season way after maize and other plants have been planted and this used to give them good quality of beans but lately that strategy has not been working.

According to one farmer (who won the best lead farmer in the SAT farmer of the year competition) the last two years have made this strategy a challenge as most farmers tried it and the rains did not come and this led to the harvesting of a very low grade of beans. He further pointed out that it has become a huge challenge to do a correct timing when it comes to the growing of beans. This is a very big set back to the farmers because beans is a crop that they grow to sell. One bucket of beans usually cost around twenty US dollars and this is a very good price so off late the unpredictable rainfall has led to the harvesting of poor quality and immature crops and this making their efforts to reduce poverty very weak.

Farmers pointed out that maize is manageable when it comes to low rainfall and also other farmers pointed out that they have used other strategies when it comes to maize. The strategies will be fully explained on the next objective. So the researcher derived that unpredictable rain has caused lots of damage particularly to the growing of beans she also noted that almost all the farmers she issued questionnaires cultivate beans. This scenario is worsened by the fact that most of the peasant farmers in Guruve have no adaptive capacity due to poverty and reliance on relatively basic technologies. It is against this background that the effects of climate change and variability have been felt disproportionately by poorer communities such as Guruve since the majority of the people are dependent on agriculture for livelihood.

4.3.3 Health Complications: Climate change ushers in health problems as a result of hunger and starvation, water stress, pests and diseases, resource conflicts, injuries and stress from extreme weather events (Ozor, 2009). Health is an important aspect when it comes to development a prospect as it is considered as one of the most contributors to social capital. For the agricultural sector to progress the farmers have to be healthy just like in any other sector. Human health, incorporating physical, social and psychological well-being, depends on an adequate supply of potable water and a safe environment. As discussed in earlier chapters human beings are exposed to climate change directly through weather patterns (more intense and frequent extreme events), and indirectly through changes in water, air, food quality and quantity, ecosystems, agriculture, livelihoods and infrastructure.

Lately cases of malaria in Guruve particularly in the lower Guruve area have increased so much that it has become difficult for farmers to carry out their field duties as actively as they should. Hunger and starvation are also hindrance to good health a certain farmer from ward 8 recalled the farming season of 2008 to 2009 were he pointed out that it was very difficult to carry out farming

activities as many people had nothing to eat it was a time where there was a severe drought he pointed out how laborious field work can be and how it is almost impossible to do that type of work on an empty stomach. One female farmer described the workload that comes with caring for the sick and maintaining household hygiene. This made the researcher realise that when there is a sick person in the family the load of taking care of the sick is usually assigned to the woman so this also affects women's full participation in the fields. However on a lighter note the researcher found out that in as much as malaria cases have increased other diseases that come as a result of extreme weather conditions such as malaria and typhoid have however very few cases in Guruve.

4.3.4 Lack of Suitable Pastures for Livestock: Climate change can result in disruption of natural ecosystems and subsequent changes in species ecological range, altering predator-prey interactions, decoupling animals from food sources and reducing habitat span. In addition to loss of pasture resulting from climate change, it is likely that livestock and wildlife will experience pressure from increased pests and diseases IPCC 2013.

Most farmers expressed with great concern that their livestock are facing a great danger due to unavailability of good pastures. Recently due to the short rainy seasons it has become very rare for communal lands to be very green for a long time and because of this it has become quite a challenge to herd the livestock. In our culture livestock particularly cattle is very significant as it symbolizes wealth and cattle are very important assets when it comes to farming. So their well being is of great importance to farmers. The decrease in precipitation coupled with an increase in temperatures has led to the nose – diving of agricultural productivity and deterioration of pastures for livestock.

The situation has been intensified by the inherent dryness of the district. Many diseases have been emerging due to this impact of CC and in some cases farmers have lost their livestock. Another

aspect threatening livestock is water scarcity in Guruve particularly ward 7 the dam that used to provide livestock has dried up and now the situation is bad to an extent that the cattle now come to drink water from the borehole, as highlighted above that the villagers take turns to look after the cattle the person who is on duty that day is the one that takes the cows and fetch water for them at the borehole. It was duly noted that because the cattle will be in large numbers most of them can not drink enough water particularly the calves and this makes them vulnerable to diseases that are associated with lack of water. Although there are important differences in how different livestock breeds respond to increased heat however reduction in the quantity and quality of feed makes the impact of CC on livestock systems severe as it leads to a higher mortality.

The researcher interviewed a female farmer who also has a poultry project and she pointed out that it is difficult for chickens to lay eggs in high temperatures she also further explained that poultry projects require to be fed with cereal crops periodically for good results but because yields have decreased it is now challenging to give her chickens as much crashed maize as she used to. Pig breeders also pointed out that pigs don't do well in high temperatures they are generally weak animals that require cool conditions and proper care. So from the above the researcher understood that livestock is greatly affected by CC as much as the farmers themselves.

4.3.4 Assessing the Usefulness of the Adaptation Strategies put in place to Mitigate the effects of CC

Under this sub heading the researcher analyzed the strategies that the farmers have put in place and analyze how they are being carried out and most importantly if they are sustainable in carrying out rural peasant farming.

4.4 Strategies Put in Place by Farmers to Mitigate the Effects of CC

4.4.1 Conservation Farming: Conservation Agriculture (CA) is a broad term, which encompasses activities such as minimum and zero tillage, tractor powered, animal powered and manual methods, integrated pest management, integrated soil and water management, and includes conservation farming (CF) Muchinapaya thesis. Conservation Agriculture is generally defined as any tillage sequence that minimizes or reduces the loss of soil and water and achieves at least 30% soil cover using crop residues. Conservation farming is characterized by the use of small farm implements such as the hand hoe to create planting basins. The concept was taken from the traditional pit systems once common in southern Africa (Mando et al., 2006). One of the major reasons that has made rural peasant farmers very vulnerable to CC is because of the over tillage of the soil composition leading to poor crop yield. So in a bid to curb this challenge farmers have started implementing conservation farming is characterised by digging pits to plant the seed popularly known in Guruve as “kutimba makomba “ this is done so as to reduce soil tillage and most importantly it is mainly used to retain moisture for a longer period rather than using oxen and ploughs.

This new cropping system has been widely introduced by NGOs as conservation agriculture which the main idea behind is to foster food security in drought prone regions like Guruve. Gukurumeetal (2010) noted that conservation farming has been used as the antidote to the impact of climate change and variability on agriculture in drought prone areas. To improve crop production in marginal rainfall regions, rural farmers are consequently adopting farming practices that conserve fragile soils and improve its fertility. It is against this background that CF which is locally known as *kutimba makomba* has been emphasized as an ideal adaptation strategy to climate change and variability in most drought prone areas in Zimbabwe. However the researcher would like to point out that most farmers find this type of agriculture rather method of farming very tiresome and

demanding and also requires physical ability to carry out Some of the farmers that the researcher spoke to were elderly people who no longer have the strength to carry out this type of farming. So it still remains a challenge as it is very strenuous so they end up using oxen and ploughs.

4.4.2 Crop Variety: Changing crop variety involves switching from one crop variety to another in response to climatic stresses and changes. This is demonstrated in adoption of climate-resilient crop varieties that are able to withstand a single or a range of climate stresses. This is more or less like crop rotation except that in other cases a farmer might actually plant different crops in the same field and this is also called multi cropping. This is yet another strategy that farmers are now putting in place since the realization that the climate is changing is the method of crop variety. This refers to the planting of many crops in the same field. This according to two farmers is done so that since the weather is now generally unpredictable at least there is a possibility that there is one crop that can suit the weather that is present during that time. The most used combination is that of maize and beans and most farmers indicated on their questionnaires that they have done this in the past and are still doing it now.

This also according to Gukurume enhances food security since there are chances that at least one of the crops will actually yield well. This also increases soil fertility as after harvesting there remains the residue of different types of crops. Another instance of crop variety is the use of seeds from different companies for example a farmer may decide to plant maize only in the field but he uses different types of seeds so as to see which one of them can adapt better to the impacts of CC.

4.4.3 Use of Small Grain Crops: Recently farmers have gone back to the traditional small grain crops these being sorghum, millet, rappoko. These crops are drought resistant and can withstand great heat waves and because of this farmers are now gradually using them in a bid to avoid food

insecurity and droughts. These drought resistant crops have thus become extremely important to the local community given the fact that they double as both food and cash crops which enables the smallholder farmers to adapt to climate change and variability and attain sustainable livelihoods.. What should be underscored here is that small grains can endure long periods without rainfall and also require less plant food hence they tend to mature early. So it is against this background that farmers have now gone back to the old days were they cultivated sorghum the researcher noticed that generally most of the farmers still cultivated these small grain crops as there are very important when it comes to making beer. In August many families in Guruve engage in ceremonies that are meant to commemorate late family members the ceremonies are well known as ” *kutamba guva* “or” *jiti*”. It is during these functions that these small grain seeds become very handy so the researcher observed that famers in Guruve are not having many challenges in growing these small grain crops as they had always done so as part of their traditional obligation.

4.4.4 Changing Cropping Calendar: This is another common adaptation to climate variability at the farm level, it requires farmers to strategically plan their farming activities to suit climatic variations or changes (Lasco and Boer 2006). It is also known as crop staggering. This is when a farmer plants his or her crops on different days. This is more of a mitigation strategy as it reduces the farmers vulnerability to drought because chances that one batch will yield are usually high. As mentioned above one of the major characteristic of CC is that of erratic and unpredictable rainfall so when a farmer changes the dates of planting in accordance to the present situation he or she may actually harvest. Farmers indicated that they usually planted their first crops during the late October rains but lately it has become very rare to rain in October so now planting is done in December. Last year in particular the rains came much later and some farmers pointed out how they had to replant after their crops had burnt in the ground so the farmers pointed out with great

confidence that nowadays due to the changing climate it is imperative for a farmer to do his timing right.

4.4.5 Water Harvesting: As indicated above most of the farmers that the student issued questionnaires had wells at their houses. Water harvesting refers to any form of collecting water usually from rain in large amounts for future purposes. Water scarcity is one of the most difficult and threatening challenges that farmers are facing. However the researcher derived that in as much as farmers had engaged in water harvesting as a form of dealing with adversities of climate change it is a big challenge (will be discussed in the following passages).

4.4.6 Community Based Adaptation: Lately communities have come up with strategies to mitigate the effects of climate change. Collective adaptation impacts individual adaptation decisions and resilience to climate change by facilitating information diffusion and risk sharing (Boahene, Snijders, and Folmer 1999; Isham 2002; Fafschamps and Lund 2003; Bandiera and Rasul 2006). (Valdivia et al. 2010) found that community workshops helped individuals identify local climate trends and adaptation strategies. Some of these strategies being put in place by farmers in the Guruve community are reforestation, community gardens and meeting up as groups to talk about CC and how it can be addressed. From the information that was given by the Agritex officer farmers are now meeting to discuss, share their experiences and advice each other on how to deal with CC. The researcher also noted that this community based approach had a gender bearing on it meaning to say there are instances where CC affects women more than men and also the other way round so it is against these backgrounds that sometimes they meet as women alone and sometimes as men alone for example men in Ward 8 constructed a well in a bid to minimize water scarcity whereas women in Ward 5 and Ward 7 established a vegetable garden to help foster food security. Farmers in Ward 7 were given gum trees to plant at the back of their fields so the

researcher found out that generally farmers have accepted the community based approach as a way of mitigating the impact of CC.

4.5 The Role of Government and Other Stakeholders in Mitigate the Effects of CC

With climate change, being a global change, requires cooperation in the implementation of national, regional and international programmes geared towards mitigating its negative effects. There is need for capacity building in forecasting and in development and use of climate models UNFCCC. Governments should be at the very core of coming up with strategies that mitigate the effects of CC. In order to understand the changing climate, Zimbabwe is taking part in the Global Climate Observing Systems (GCOS) activities of the World Meteorology Organization (WMO) and is monitoring climate by maintaining a systematic observation network. Meteorological and atmospheric observations in Zimbabwe cover two aspects of the GCOS; the Global Surface Observations (GSO) and the Global Upper Air Observations (GUAO). This information help establish the nature and extend of CC in Zimbabwe hence the meteorology department is of great importance when it comes to issues of CC as they are the ones that provide the accurate recordings at ground. Zimbabwe has ratified the UNFCCC but has no independent standalone climate change policy and legislation. Climate change issues are covered by various uncoordinated sectoral policies, strategies and action plans.

These sectoral policies are largely biased towards environmental protection. For example, the National Environment Policy addresses climate change in terms of air and water pollution, land degradation, loss of biodiversity, management of protected areas and forests, transboundary natural resources management and the environmental impacts across social and economic sectors that include mining and agriculture. Zimbabwe is a party to the UNFCCC and the Kyoto Protocol

on Climate Change and other multilateral environmental agreements such as the United Nations Convention on Combating Desertification (UNCCD), Convention on Biological Diversity (CBD) and its Protocol on Bio safety and the RAMSAR Convention on Wetlands (The Convention on Wetlands of International Importance especially as Waterfowl Habitat). As mentioned earlier on Zimbabwe has no stand alone policy of CC but the issues are evident in other policies.

In Guruve the researcher found out that although there are no tangible policies that have been put in place by the government there are ways that the government have put in place to ensure that farmers are adapting these include training them on how to farm in respond to the changing climate through the Agritex officers the government also gives each household seed and two bags of fertilizers as a way to increase their capacity. After the interview with the councillor the student noted that the government has been involved with reforestation initiatives by giving farmers seed and potted trees to plant in a bid to curb deforestation.

However the researcher derived that the government's response to CC issues is not satisfying and little is being done to address the issues at hand especially to the rural peasant farmers. For example one can look at the Rural District Councils, they have limited capacity to reduce exposure and to cope with consequences of extreme weather conditions such as flooding, storms, droughts, heat waves and cold spells and their impacts on local communities. The Councils lack capacity to respond to emergencies and are unable to provide protective infrastructure or alternative settlements for those living in flood and hazard prone areas because of limited investment capacity. So the student came to a conclusion that the government is not doing enough to help the farmers mitigate the effect of climate change.

4.6 The role of Environmental Management Agency (EMA)

EMA is an organization that mainly focuses on the environment and how people are treating the environment that they are living in. EMA has been carrying out public awareness campaigns on the issue of climate change and how it's affecting the environment including agriculture. It has been teaching people on the dangers of veld fires how it's one of the leading cause of cc. EMA also puts a great emphasis on the importance of practicing sustainable environmental activities.

4.7 The Role of NGOs in Mitigating the Effects of CC

From the interview with Mr. Tafirei the field officer for Wards 7 and 8 the researcher was told that SAT has been assisting farmers to deal with the effects of CC. He pointed out that SAT's major activity is carrying out conservation agriculture as an adaptation form he then went on to describe how they also help farmers engage in other practices such as mulching, selection of early maturing and drought tolerant crops, staggering(planting on different dates), and also zero tillage. He added that they also assist farmers with fertilizers, seeds and herbicides to increase their capacity. He also indicated how they carry out periodic assessment to check progress and challenges on each farmer, he told the researcher that he meets with farmers every week to discuss about their farming activities and this is where they always talk about CC. The interview with LGDA projects manager produced almost the same responses since they do similar projects but in different wards, however Mrs Janga pointed out that their organization has started giving farmers small grain crops to cultivate unlike SAT.

The researcher however evaluated that although these organizations SAT in particular are doing a great job in increasing the farmers capacity most farmers can not join their programme as they have to pay a certain amount of money to be able to join so since most of the farmers do not have the money they end up not joining and still remain vulnerable. There are also challenges involved

with NGOs for example they are usually associated with politics being seen as agents of regime change so this makes them un accepted in some communities.

4.8 Challenges being faced by farmers in trying to implement these strategies

- **Lack Of Capital:** Most of the farmers in the Guruve area do not have enough money to help them build resilience against CC, for example one can look at the programmes that are being carried out by NGOs such as SAT. Most farmers would really want to join such programmes as they really increase the farmers' capacity to withstand the atrocities of CC.

- **Lack of Physical Strength:** Some of the farmers that the researcher issued with questionnaires were people over the age of 60 and as required by the aspect of conservation farming that people have to dig the pits to plant the seeds using hoes for some farmers who are now elderly it has really proved to be hard and strenuous and in some instances they cannot afford to hire labour so they end up using the plough and oxen method and still remain vulnerable to CC.

- **Lack of Unity:** As indicated above there is a community based approach where all member of the community are supposed to come together and fight the effects of CC. Other farmers pointed out with great concern that there are some farmers who do not want to work together as a group for example when the men in Ward 8 and decided to construct a well as a way of curbing water scarcity some men did not even show up this weakens the essence of "community based adaptation" as some do not want to take part in community activities.

- **Lack of Accurate Information:** In as much as the stakeholders in the agricultural sectors are now gradually educating farmers on issues of CC most of them generally still lack knowledge pertaining CC. The researcher at first faced some challenges when she gave her questionnaires to some farmers, although they know that things regarding weather are changing they lack the solid

facts as to why and how it is happening. Some were very shocked when the researcher asked them if they knew that practices such as veld fires and deforestation are some of the causes of CC.

•**Corruption:** Many farmers indicated that they did not receive their seeds and fertilizers from the government and this is being due to corruption. Efforts to build resilience against the impacts of climate change are being hammered by corrupt tendencies from local authorities where aid does not get to the intended beneficiaries. Farmers also highlighted that they need the government to be more involved in these issues and also make sure that people receive their aid.

So from the above challenges the researcher realized that farmers are really having a hard time in trying to mitigate the effects of CC, and as a result they end up engaging in other activities as a way of diversifying their livelihoods such activities include the brewing and selling of alcohol “kachasu”. This as one can see does not help to achieve development in a community it actually increase social problems such as increased crime rates, theft, and violence. Another way that is being used to diversify livelihoods is the cutting down of trees as selling firewood also this is not good as it actually causes CC.

Chapter summary

This chapter is very important for the research as it give a full account of what happened during the research and data collection period. It also gives the researcher the opportunity to check if she achieved her objectives. The chapter did not only look at what happened at the field but the researcher also managed to analyze the findings of the research.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMENDATIONS

5.0 Introduction

This topic concludes the whole research as it gives the final conclusions on the researcher's findings. The researcher will also give suggestions and recommendations in this chapter. The chapter will also comment on the research findings in relation to the objective, establishing whether the objectives were achieved or not.

5.1. Conclusions

In responding to the first objective “to assess how rural peasant farming is being carried out in Guruve” in Guruve the researcher achieved her objective as she became well informed of the characteristics of RPF in Guruve and how they generally carry out their agricultural practices. The researcher did not only use key informant from NGOs and Agritex but also issued questionnaires to the farmers that answered the questions that helped in explaining the way RPF is being carried out in Guruve. So from the information gathered the researcher noted that RPF is basically smallholder farming that is being carried out in rural setups it is characterized by the use of family oriented labour, usually farmers do not have one big plot but rather they have small many farms. She also noted that under RPF local traditional authorities play a very crucial role as they are the ones that allocate farms and also if aid comes the head man is the one who does the name compilation for the beneficiaries. The student also took into account that agriculture is the basis of the livelihoods in the Guruve area so they do not only use their crop products for food but also used to generate income and diversify their livelihoods.

The second objective was to assess the perception of rural peasant on their agricultural practices. From the researcher's findings she noticed that in as much as most of the farmers are not fully aware of the term "climate change" they are fully aware of the changes that are taking place when it comes to issues that are weather related. They pointed out various factors that indicated that they had noticed some changes over the time such as erratic and unpredictable rains, short rainy seasons and also very high temperatures. This according to information given by the farmer has led to the production of immature crops, water scarcity and increased health problems to people and livestock. This objective was greatly achieved as the researcher was given a clear view of what the farmers were thinking, their perception of the effect of CC on their agricultural practices.

The final objective was to assess the usefulness of the adaptation measures that were put in place by farmers to mitigate the effects of CC. Under this objective the researcher asked the farmers the measures they are putting in place to adapt to the changing climate and also what other stakeholders in the agricultural sector have done to help these farmers the researcher also asked if the farmers felt that the measures were sustainable. The farmers pointed out that their measures are not as sustainable as they should be as they have a very small capacity and are generally vulnerable to the effects of CC. They called on stakeholders to help as much as they can particularly the government.

In summary the above are the objectives that were put at the very beginning of the study and although the researcher faced some challenges in trying to compile the research findings she can safely say she managed to achieve all her objectives.

5.2. Recommendations

- The government of Zimbabwe must increase the RDCs capacity to help farmers be more resilient to the effects and impacts of CC through financial resources. Council must intensify the holistic land and livestock management program so that all the residents would be able to enjoy its fruits.
- Farmers should be educated and well informed when it comes to issues of CC agriculture workers in the government particularly the ones from Agritex must clearly and fluently explain CC to farmers and how they can adapt and mitigate its effects.
- There must be good relations between the government and civil society particularly NGOs so that conflicts between the two do not hinder sustainable development prospects Local authorities should form partnerships with the private sector, community-based organisations and Non-governmental Organizations in the provision of services to the local people so as to capacitate them in this climate change era.
- CC studies should be introduced in schools particularly secondary schools up to the tertiary level.
- Small incentives must be given to farmers who engage in practices that actually reduce CC such as afforestation and also to those who are participating in practices that are adapting to CC (this is to help motivate them and also inspire others to do the same).
- Government must have its own cc policy which can be used as a basis in trying to come up with strategies to mitigate the effects of cc.

- Farmers must learn to work together and unite as a community so that the community based adaptation approach will get its essence and produce good results.
- Lobbying for better enforcement of laws through the engagement of law enforcers such as the police as well as EMA so as to reduce the cases of veldfires and deforestation.

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APPENDIX

Introductory letter

My name is Maraya Tinashe F. I am an undergraduate student at the **Midlands State University** studying Bachelor of Arts (Honours) Degree in Development Studies. As part of my studies i am carrying out a research study entitled: **The impact of climate change on rural peasant farming**. I would like if you may kindly spare a few minutes of your time to complete this questionnaire. There is no right or wrong answer. This information is strictly confidential; please do not write your name. The responses will be used for academic purposes only.

Questionnaire guide to the small holder farmers.(please tick were appropriate)s

1. How long have you been engaged in small scale farming?

- a) 5-10 years
- b) 10-15 years
- c) 15-20 years
- d) More than 20 years

What crops do you cultivate?

- a) Maize
- b) Cotton
- c) Beans
- d) Sorghum
- e) Millet
- f) Potatoes
- g) Others specify

2. Why that particular crop?

.....

3. Is your harvest changing over the years?

Yes or No (please tick where appropriate)

Yes

No

If yes, how?

.....

4. What changes have you noticed regarding temperature and rainfall lately
 - a) Increase in both temperature and rainfall
 - b) Decrease in both temperature and rainfall
 - c) Increase in temperature and decrease in rainfall
 - d) Increase in rainfall and decrease in temperature
5. How is this affecting your yield?

.....

.....

6. What are your water sources?
 - a) Borehole
 - b) Well
 - c) Dam
 - d) River
 - e) Other specify

7. What have you noticed regarding water table in recent years?
 - a) Increase
 - b) Decrease

8. How has these changes affected your livestock

9. What coping strategies have put in place in trying to mitigate these effects

.....

.....

.....

10. What has the government and other stakeholders done in relation to climate change?

.....

.....
11. How sustainable are these measures?

.....

.....

12. What challenges are you facing in trying to implement these strategies?

INTERVIEW GUIDE

Introductory letter

My name is Maraya Tinashe F. I am an undergraduate student at the **Midlands State University** studying Bachelor of Arts (Honours) Degree in Development Studies. As part of my studies i am carrying out a research study entitled: **The impact of climate change on rural peasant farming** . I would like if you may kindly spare a few minutes of your time to complete this questionnaire. There is no right or wrong answer. This information is strictly confidential; please do not write your name. The responses will be used for academic purposes only.

Interview guide to the Ministry of Environment and Natural Resource Management officials (Climate change department).

1. What do you understand by the term climate change?
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.....
2. What evidence have climatologist given to show that the climate is changing
.....
.....
3. How is climate change impacting agriculture
.....
.....
.....
4. How is the government addressing these impacts regarding agriculture
.....
.....
.....

.....
5. How sustainable are these measure?
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.....

.....
6. What are the challenges being faced by the government in trying to implement these strategies
.....
.....
.....
.....
.....
.....

7. Has there been any help from other stakeholders
.....
.....
.....

RELEASE FORM

NAME OF STUDENT: Tinashe Fungisai Maraya

DISSERTATION TITLE: Effects of climate change on rural peasant farming: a case of:

Guruve

DEGREE TITLE: BA in Development Studies Honours Degree

DEGREE GRANTED: 2014

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