

Climate change and the socio-economic livelihoods of rural women in semi-arid region of  
Mbire District in Zimbabwe

By

Aquillina Mutsa Nzombe (48369136)

A dissertation submitted in partial fulfilment of the required for the degree

Of

Master of Arts in Development Studies (98412)

In

Department of Development Studies

At the

UNIVERSITY OF SOUTH AFRICA

Supervisor: Professor M. Ndlovu

February 2021

## DECLARATION

Name: **Aquillina Mutsa Nzombe**

Student number: **48369136**

Degree: **MA (DEVELOPMENT STUDIES)**

Exact wording of the title of the dissertation as appearing on the copies submitted for examination:

**CLIMATE CHANGE AND SOCIO-ECONOMIC LIVELIHOODS OF RURAL WOMEN IN THE SEMI-ARID REGION OF MBIRE DISTRICT IN ZIMBABWE.**

---

I declare that the above dissertation is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.



---

**SIGNATURE**

**26 February 2021**

**DATE**

## **ACKNOWLEDGEMENTS**

I would like to express my sincere appreciation and gratitude to my supervisor, Professor Morgan Ndlovu, for his unwavering support, guidance, patience and encouragement throughout the course of my academic journey. Throughout this journey, Professor Morgan Ndlovu has contributed immensely towards making this challenging journey endurable and surmountable.

My heartfelt appreciation and gratitude also go to the participants in the research who availed themselves and participated enthusiastically during the fieldwork providing valuable information in the interviews and focus groups. I am grateful for Councillor and Headman for giving the permission to carry out the research in the villages. Also, the women who travelled long distances from different villages to attend the focus group interviews and the individual participants who shelved their day-to-day chores and spared time to be interviewed. Their participation in the interviews contributed positively to a successful research.

## **DEDICATION**

I dedicate this work to the Almighty God who strengthened me throughout this academic journey. I also dedicate the work to my late parents Barnabas and Aloisia Nzombe. Seeing the completion of this dissertation would have made them very much proud.

## **ABSTRACT**

Climate change has negatively affected people throughout the world including decimating the socio-economic livelihoods of rural women who rely mainly on agriculture as their backbone. This qualitative study deploys the exploratory research approach using a case study design to have an in-depth understanding of the effects of climate change on the socio-economic livelihoods of rural women in the semi-arid region of Mbire District in Zimbabwe. The study employed the Sustainable Rural Livelihood Approach as its theoretical framework to contextualise the study and followed the snowball and purposive sampling approaches to select the study participants. Data for the study was collected through face-to-face interviews, focus group discussions and key informant interviews. The data was analysed using thematic content analysis and it was found amongst others that the effects of climate change have worsened the state of rural women households, livelihoods and agriculture alone cannot sustain their livelihoods. The study recommended, amongst others, the continuation of support from government, international and local NGOs. The study also recommends contingency measures to be put in place to combat incidents brought about by floods, droughts, violent winds and storms.

## TABLES OF CONTENTS

DECLARATION .....	i
ACKNOWLEDGEMENTS .....	ii
DEDICATION .....	iii
ABSTRACT .....	iv
TABLES OF CONTENTS .....	v
LIST OF FIGURES .....	ix
LIST OF TABLES .....	x
LIST OF ABBREVIATIONS .....	xi
CHAPTER 1: INTRODUCTION AND BACKGROUND .....	1
1.1 Introduction .....	1
1.2 Background to the problem .....	2
1.3 Problem statement .....	4
1.4 Importance of the study .....	5
1.5 Research objectives .....	6
1.5.1 Key research questions .....	6
1.6 Area of the study .....	7
1.7 Limitations of the study .....	7
1.7.1 Mobilisation of study participants .....	7
1.7.2 Securing the meeting venue .....	8
1.7.3 Gathering the focus group members .....	8
1.8 Dissertation chapters layout .....	8
CHAPTER 2: LITERATURE REVIEW AND THEORETICAL FRAMEWORK .....	11
2.1 Introduction .....	11
2.2 Understanding Climate Change .....	11
2.2.1 Climate change and gender .....	13
2.2.2 Climate change and natural resources .....	13
2.2.3 Climate change, women and agriculture .....	14
2.3 Sustainable Rural Livelihood Approach .....	16
2.4 Clarification of key terms .....	18
2.4.1 Climate Change .....	18
2.4.2 Socio-economic development .....	18
2.4.3 Rural women .....	19

2.4.4 Livelihoods .....	19
2.4.5 Semi-arid regions.....	19
CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY.....	20
3.1 Introduction .....	20
3.2 Research Design.....	20
3.3 Research Approach .....	20
3.4 Study Population .....	21
3.4.1 Sample Frame .....	21
3.4.2 Sampling Techniques .....	21
3.4.3 Sample Size .....	22
3.5 Data-gathering procedures .....	22
3.5.1 Data gathering instruments.....	22
3.5.2 Data sources.....	23
3.5.3 Data collection techniques.....	24
3.5.3.1 Face-to-face interviews.....	24
3.5.3.2 Focus group discussions .....	25
3.5.3.3 Key informants and secondary data.....	26
3.5.4 Data analysis strategies.....	27
3.5.4.1 Transcription of interview audio recordings.....	27
3.5.4.2 Coding of data and development of themes.....	28
3.5.4.3 Comparison of the themes across data sources and data collection techniques.....	28
3.5.4.4 Interpretation of data.....	28
3.5.5 Validity and Reliability .....	29
3.5.6 Plan for pilot studies or testing of data-gathering instruments.....	30
3.6 Ethical Considerations.....	31
3.6.1 Privacy.....	31
3.6.2 Anonymity and confidentiality .....	32
3.6.3 Voluntary participation and the right to withdraw .....	33
3.6.4 Informed Consent .....	33
3.6.5 Do not harm.....	34
CHAPTER 4: RESEARCH FINDINGS.....	35
4.1 Introduction .....	35
4.2 The experiences of climate change on socio-economic livelihoods of women in the semi-arid region of Mbire District, Zimbabwe. ....	35

4.2.1 Has the rainfall pattern changed, that is the onset of the season and ending of the rain season changed over the years? .....	35
4.2.2 How has violent winds, storms, and floods affected them over the years? .....	39
4.2.3 What type of livestock do you rear to generate income? .....	41
4.2.4 What type of crops/cash crops do you grow to generate income? .....	44
4.2.5 Natural Resources and Wildlife Utilization.....	47
4.2.6 What type of Non-Timber Forest Products do you harvest? .....	48
4.2.7 Wildlife meat .....	49
4.2.7.1 What are your sources of game meat? .....	50
4.2.8 Human-wild life conflict .....	51
4.2.8.1 Hippopotamus and humans .....	51
4.2.8.2 Elephants, livestock and humans .....	52
4.2.8.3 Lions, livestock and humans .....	53
4.2.8.4 Monkeys, Livestock and Humans .....	54
4.2.6.5 Quelea birds, livestock and humans.....	55
4.3. What are the adaptations or coping mechanisms that can be implemented to mitigate the effects of climate change? .....	58
4.3.1 What are the adaptation/copying measures being implemented on live stock? .....	58
4.3.2 Adaptation/coping measures on crop production and human and wildlife conflict on crops.....	63
4.2.4 Adopting indigenous knowledge systems as an adaptation measure .....	66
4.2.4.1 Traditional adapting/coping measure of storing food.....	68
4.2.5 What are the likely interventions by foreign and local aid to address the effects of climate change on the socio-economic livelihoods of rural women in semi-arid region of Mbire District?.....	68
4.2.5.1 Government interventions.....	69
4.2.5.2 Initiatives by Non-Governmental Organisations .....	72
4.2.5.3 Mbire Rural District Council .....	77
<b>CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>80</b>
5.1 Introduction .....	80
5.2 Conclusion on the research findings .....	81
5.3 Recommendations of the study .....	87
<b>REFERENCES .....</b>	<b>89</b>
<b>APPENDIX A: FOCUS GROUP PROGRAMME .....</b>	<b>98</b>



## LIST OF FIGURES

Figure 4.1: The dry section of Manyame/Hunyani River .....	38
Figure 4.2: One household surviving poultry due to high temperatures.....	42
Figure 4.3: Rearing guinea-fowl as an adaption to climate change .....	59
Figure 4.4: Goats being sold as a way of sustaining socio-economic livelihoods.....	62
Figure 4.5: Gardens along Manyame/Hunyame River .....	65
Figure 4.6: Monkeys hanging outside the garden waiting for a chance to raid the vegetable garden and a man standing next to the borehole in the garden .....	65
Figure 4.7: Temporary structure next to garden to guard against intruding wildlife.....	66
Figure 4.8: A cooperative project for women as an adaptation measure to sustain their socio-economic livelihoods .....	74
Figure 4.9: Garden at the Mushumbi Livestock and Crop Innovation Centre for women empowerment and climate change adaptation .....	74
Figure 4.10: Pen-Fattening for the cross breeding of indigenous and exotic Boer goats .....	75
Figure 4.11: A chemical treatment room and Seed Bank at the Mushumbi Livestock and Crop Innovation Centre.....	76
Figure 4.12: A public television under construction intended to warn the community members about natural disasters such as violent winds, storms, floods and other information of paramount importance. ....	78
Figure 4.13: A storage warehouse in the Mbire District Council premises under construction intended to store blankets, tents and other necessities as a contingent plan in case of natural disasters such as storms, floods and violent winds. ....	79

## **LIST OF TABLES**

Table 1.1: Time Framework: Research Schedule .....	9
Table 4.1: Human wildlife victims in Mbire District (March 2015 to February 2019).....	56
Table 4.2: Livestock sales from Mbire District (2014 to 2019) .....	62

## **LIST OF ABBREVIATIONS**

AIDS	Acquired Immune Deficiency Syndrome
ARDA	Agricultural and Rural Development Authority
AWA	Africa Wildlife Association
CAMFED	Campaign for Female Education
CNN	Cable Network News
DAs	District Administrators
DCP	Department of Civil Protection
DCPC	District Civil Protection Committee
FAO	Food and Agriculture Organisation
GDP	Gross Domestic Product
HIV	Human Immunodeficiency Virus
ICPP	Intergovernmental Panel on Climate Change
NGO	Non-Governmental Organisation
NCPC	National Civil Protection Coordination Committee
NWFP	Non-Wood Forest Products
NTFP	Non-Timber Forest Products
PAs	Provincial Administrators
PCPC	Provincial Civil Protection Committee
UNDP	United Nations Development programme
UNISA	University of South Africa
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WASH	Water Sanitation and Hygiene
WHO	World Health Organisation

## **CHAPTER 1: INTRODUCTION AND BACKGROUND**

### **1.1 Introduction**

Climate change has affected and will continue to affect more people in the world if feasible measures are not taken into consideration to save mother earth. Agriculture contributes significantly to the economy of most African countries, with the Sub-Saharan Africa averaging 17.1% of the Gross Domestic Product (GDP) (World Bank, 2015). Agriculture is known to be very sensitive to climatic conditions hence it is very vulnerable to the risks and impacts of climate change (Smit & Skinner, 2002). The Intergovernmental Panel on Climate Change (IPCC) (2007) estimates that Africa is the continent that will be most affected by climate change because of its poor infrastructure, high levels of poverty and poor governance. Furthermore, (IPCC, 2007), indicates that most of the African countries do not have strong policies to counter the effects of climate change mainly due to poor planning on adaptation to climate change. National policies in most of these countries are not in place or are not clear on priorities and key areas of action when dealing with climate change adaptation. There is need for strong policies linking the agricultural and environmental sectors to increase resilience and food security (Mavhura, 2017).

According to World Bank (2018), the world's poorest and those in vulnerable situations, especially women and girls, disproportionately bear the negative environmental, economic and social impacts arising from shocks induced by effects such climate change. In semi-arid regions such as the Mbire District of Zimbabwe, the effects of climate change include aridity caused by increasing frequency of droughts; and shocks caused by floods and violent storms resulting in frequent annual food shortages.

According to Mavhura (2017), the floods cause great damage to houses, crops, electricity supply lines and food stocks. They also promote the spread of diseases, such as, malaria and cholera. Economic activities are disrupted, thereby creating financial stress on the poor and vulnerable people in communities. Increased frequencies of floods and violent storms have also contributed to frequent annual crop production failures and destruction of homes and physical infrastructure. Furthermore, Mavhura (2017) denotes that these negative effects are exacerbating the already unsustainably high poverty levels. The situation in Zimbabwe is worsened by the economic situation which has been in decline for the past few decades.

Vulnerable groups, such as, female-headed households and HIV/AIDS affected households have been impacted the most by climate change.

Increased poverty in remote semi-arid rural areas may also be aggravating other negative effects of rural poverty, such as, men migrating to urban areas leaving women burdened by family responsibilities on their own. By so doing, this has rendered them vulnerable to HIV/AIDS as some resort to commercial sex as a livelihood strategy to acquire food. According to the Cable News Network (CNN) (2019), drought and resultant issues around food security were also shown in a recent study to affect rates of new HIV infections. The study found that adolescent girls exposed to severe drought conditions in rural Lesotho had higher rates of HIV infections than in urban areas. The adolescent girls in rural Lesotho were also more likely to engage in high-risk behaviours, including sex work, and were more likely to drop out of school.

According to Oxfam America and The Women's Environment and Development Organisation (WEDO) (2009), the cycle of poverty triggered by the climate change effects may be very difficult to break. Most children are left as orphans due to HIV/AIDS and the sickly women fail to work for their families which in turn results in increased poverty levels, girls dropping off from schools and high teenage pregnancy.

This study seeks to increase the understanding on the social and economic effects of climate change on rural women, a group which is key to household livelihoods strategies in most rural areas located in semi-arid regions. The research will also examine how the indigenous knowledge systems are being used in driving adaptive management strategies to mitigate the effects of climate change in these semi-arid regions. The knowledge gained from the study may be useful to government policy makers and development partners in developing informed strategies to mitigate the impact of climate change effects.

## **1.2 Background to the problem**

According to Seidman (1992:138), Zimbabwe is divided into five agro-ecological regions called natural regions. The research was conducted in the Mbire District which is in Lower Middle Zambezi Valley's Manyame catchment in the Zambezi River Basin. Mbire District is located in Natural Region 5, which is semi-arid and receives an average of 400-650mm of rainfall per annum. The mean annual temperature ranges from 21 and 25°C; with mean

maximum temperature ranging from 26 to 32°C and mean minimum temperature ranging from 14 to 18 °C (Munodawafa, 2013).

Erratic rainfall patterns inhibit proper plant growth in semi-arid regions. Following the dry spells, floods often occur mid-season, thereby washing away crops in the fields. The combination of dry spells, erratic rainfall patterns and floods eventually lead to extremely low yields. Given that villagers of Mbire District have limited livelihoods options, food security is seriously threatened by these climatic factors (Munodawafa, 2013).

Communities in Zimbabwe have experienced major climatic events which include the droughts seasons experienced in the years 1991-1992; 1994-1995; 1997-1998; and 2002. The El-Niño effect also caused the devastating floods of 1997 – 1998 (Dilley, 2000). These drought periods have been associated with negative impacts on livelihoods. For instance, during the 1991-1992 drought, the income of poor rural communities in Zimbabwe dropped by 50 percent (World Bank, 2000). Floods and droughts create additional burdens for those communities already poor and vulnerable.

Located in lower Manyame sub-catchment, which is in Zambezi river basin's middle Zambezi valley; Mbire District is exposed to two types of hazards (Oldreive, 1993). The first hazard consists of weather induced floods and also floods which are caused by the operation of Kariba and Cabora Bassa Dams. The Kariba Dam is located upstream while the Cabora Bassa is downstream (Madamombe, 2004). The second risk is drought and prolonged dry-spells which result in crop failure and food shortages (Fritz 2003). Thus, Mbire District is vulnerable to both floods and droughts.

This study highlights the effects of climate change and how it has negatively affected the socio-economic livelihoods of many people in Zimbabwe, especially rural women in the semi-arid regions of Mbire District who are the breadwinners of many households. Mbire District is mainly affected by floods which result in the reduction of crop yields, food security, and the death of domestic livestock and wild animals due to extreme temperatures. Some of the effects include resettlement of people in search for greener pastures, reduction in income derived from agriculture produce, human and wildlife conflict, increased water borne diseases, HIV/AIDS, and reduction of clean water for household uses including drinking. The effects of climate change are disproportionately felt by women, especially the elderly who

rely on agricultural activities as a way of sustaining their socio-economic livelihoods. The climatic conditions have not made life easier for these rural women since their socio-economic livelihoods are negatively affected.

### **1.3 Problem statement**

Climate change is causing a number of challenges including putting on an already fragile food production system resulting in a marked reduction in food production and consequently food insecurity. The lives of communities are put at risk with the increase in the prevalence of adverse conditions, such as, droughts, floods, cyclones, hurricanes, ocean acidification and increasing sea levels (FAO, 2015). A recent example is the floods experienced as a result of cyclone Idai and cyclone Kenneth that caused floods in Mozambique, and parts of KwaZulu Natal in South Africa and Chipinge in Zimbabwe. The United Nations Development Programme (UNDP) (2019), stresses that tropical cyclone Idai is one of the worst natural disasters to have impacted Africa. Within six weeks, cyclone Kenneth made landfall across the northern coast of Cabo Delgado, also causing widespread flooding and devastation. These conditions are increasingly affecting the socio-economic livelihoods of women in rural areas, affecting agriculture, ecosystem and infrastructure.

Climate change has led to erratic rainfall resulting in an increase in the prevalence of drought, floods and tropical storms (Chikodzi, 2013; Mendelsohn, 2000). It has also resulted in the increase in mean temperatures thereby increasing evapotranspiration leading to loss of moisture available for crop production. This has led to increased malnutrition as most households do not have income to purchase food to supplement their harvest. In Zimbabwe, rainfall is the major limiting factor in agriculture and high temperatures render the rainfall received less effective as it increases the evaporation rate (Makuvaro, 2015).

Women run most of the households with wide ranging domestic responsibilities, such as, looking after the children, and walking long distances to fetch firewood and water for drinking, cooking and other uses. The climatic conditions in the semi-arid regions are worsened by the little or no rainfall at all received during the wet season. According to Brummer (2002), the level of migration can explain the dissimilarity in HIV prevalence figures in different parts of Africa. In the case of Southern Africa, the largely seasonal or temporary character of migration (especially labour migration), with most male migrants returning home to their families on a regular basis, has facilitated the rapid spread of

HIV/AIDS. Furthermore, Brummer (2002), stresses that the scarcity of economic opportunities in poor communities has caused hunger, vulnerability to diseases by women. For example, HIV/AIDS infections are high in communities where male migrant labourers go away in search of greener pastures and return home periodically. Broken families are also rife as a result of the migrant labour system.

In the Mbire District, communities are feeling the effects of climate change as there are many dangers, such as, conflicts among humans and wild life. There is a scramble for scarce resources with unequal access within communities. Manyamwe/Hunyani River which has been the major water body is slowly drying up including some of the wells and boreholes. Villagers are attacked by wildlife when they go to the river to fetch water to water gardens and for domestic use. Domestic animals are killed by wildlife when they go to river to drink. The encroachment of human beings in the habitat of wild animals has caused unrest in the communities. Wild animals roam in their fields and feed on and destroy field crops, such as, sorghum, beans (nyemba), maize, groundnuts. Long dry spells have caused hunger and deaths of livestock, such as, poultry, cattle and pigs. The extreme temperatures have negatively affected the rearing of poultry, especially in the summer season (September/October) because of the scorching sun. The poultry is susceptible to the heat and they eventually die. According to Gandiwa, Heitkonig, Lokhorst, Prins and Leewis (2013), human-wildlife conflicts can take various forms, including carnivores attacking and killing livestock or humans, species raiding crops, competition for game and/or resources, disease exchange between livestock and wildlife, carcass poisoning, and retaliation killing. This has affected the socio-economic livelihoods of rural women in the Mbire District because poultry rearing was their main source of income. Most women would sell poultry to raise money to buy basic commodities for household consumption. Poultry was also a good source of protein that was easily available for most households.

#### **1.4 Importance of the study**

According to Pereira (2017), much of Africa's vulnerability to climate change lies in the fact that its agricultural systems remain largely rain-fed and underdeveloped. The majority of Africa's farmers are small-scale farmers with few financial resources, limited access to infrastructure, and disparate access to information. Furthermore, FAO (2019), concurs with the fact that the impacts of climate change are reducing the capacity of natural resources (biodiversity, soil and water) to sustain the food demand of the world's increasing population.

Food security and climate change are therefore interlinked phenomena that need to be addressed concurrently.

The importance of carrying out this research is to amplify awareness on climate change and socio-economic livelihoods of rural women in the semi-arid regions. Agriculture is the backbone of every household in the rural areas and climate change has negatively impacted agricultural productivity. I have a firm belief that despite the fact that climate change effects could be one of the key factors negatively affecting the livelihoods of people in rural areas, there is little awareness not only among the victims which are rural communities but also among all levels of government in Zimbabwe from ward, district, provincial and national levels. Amplifying the level of awareness among key players may catalyse appropriate interventions to mitigate the negative impacts of climate change on various groups including rural women. This study is important as it also adds to the body of knowledge on the importance of mitigating contingency plans in case of natural disasters, such as, floods and drought which are the main problems faced by the communities in Mbire District.

### **1.5 Research objectives**

The study addresses the following objectives:

- To understand the effects of climate change on the socio-economic livelihoods of rural women in the semi-arid region of Mbire District.
- To evaluate the adaptation or coping mechanisms of rural women, including the use of Indigenous Knowledge Systems applied to mitigate the effects of climate change.
- To establish potential areas of the intervention by foreign and local aid to address the effects of climate change on the socio-economic livelihoods of rural women in semi-arid region of Mbire District.

#### **1.5.1 Key research questions**

The study was guided by the following research questions:

- What are the effects of climate change on the socio-economic livelihoods of rural women in the semi-arid region of Mbire District?
- What are the Indigenous Knowledge Systems, adaptations or coping mechanisms that can be implemented to mitigate the effects of climate change?

- What are the potential areas of intervention by foreign and local aid to address the effects of climate change on the socio-economic livelihoods of rural women in the semi-arid region of Mbire District?

## **1.6 Area of the study**

The study area is Mbire District, which lies in a typical semi-arid environment characterised by low and erratic rainfall (below 400 mm per annum), and shallow and stony soils. The area is characterised by very high summer temperatures (up to 40 °C), erratic water supplies (and saline-tasting, if available), and rugged terrain (which means infrastructural development has lagged behind), and remoteness to markets, (Mazara, 2017; Chikodzi *et.al.*, 2013). It lies in the mid-Zambezi valley, approximately 200 km from Harare (Mazara 2017). The environmental setting of this district provides an excellent opportunity for conducting the proposed research. Accessing the research area from Harare is not logistically difficult and reaching out to communities is relatively easy as villages are concentrated where water is available i.e. along rivers or where artificial sources have been established. Mbire District area was one of the districts with few recorded cases of COVID-19 which made the research feasible even under the pandemic.

## **1.7 Limitations of the study**

### **1.7.1 Mobilisation of study participants**

The first limitation of the study was identifying the female participants for the study who were fifty-five years and above. This age-group was the screening criterion as it meant that this was the right age with the historical knowledge of climate from the rainfall pattern, droughts, floods, violent winds to the scarcity of natural resources for household purposes and other uses over the years. The COVID-19 pandemic presented a major challenge as the desired category of participants aged fifty-five years happened to be also more susceptible to contracting the Corona virus because most of them are on chronic medication for underlying conditions, such as, high blood pressure, diabetes and heart conditions.

The Level 4 lockdown at the time also meant that most of these women had their children at home since schools were closed in an effort to contain the spread of the Corona virus. This meant that they had to be home and take care of the children. However, through the assistance by the Councillor, the Headman (Sabhuku), and the Community Project

Coordinator from Mbire Rural District Council, I managed gather an adequate number of participants for the study.

### **1.7.2 Securing the meeting venue**

The other constrain was securing the venue for the focus group interview as the conference hall was operating on certain days due to the lockdown restrictions. However, the researcher finally managed to secure the venue at the Lower Guruve District Council in Mushumbi Pools through the assistance of the Councillor, the Headman, and the Community Project Coordinator and verbally agreed to abide by the lockdown regulations of the COVID-19, which are social distancing, wearing masks, sensitisation and checking the temperature of the participants before commencing the focus group discussions.

### **1.7.3 Gathering the focus group members**

The other problem was finding the focus group participants with the age range between fifty-five to sixty years. However, I eventually managed to find them including some individual participants that were seventy years and above and who were still able to work in the fields, walk long distances looking for firewood, fetching water and other day to day household chores. The focus group and the individual participants were able to provide information regarding their experiences of the effects of climate change on their socio-economic livelihoods in the semi-arid region of Mbire District.

## **1.8 Dissertation chapters layout**

The dissertation is organised in five chapters as described below.

### **Chapter 1: Introduction and Background**

This chapter unpacks the research topic, the key research questions, explores the background to the research problem, importance of the study, research objectives, scope of the study, limitations of the study and study area of research. The researcher explores climate change and the socio-economic livelihoods of women in rural semi-arid regions of Mbire District in Zimbabwe.

### **Chapter 3: Literature Review and Theoretical Framework**

This chapter presents the existing body of scientific literature published in the same field as the proposed study. The literature review consists of reviewed empirical, theoretical and

methodological literature. The chapter also summarises the theoretical framework that guides the study. The Rural Livelihood Sustainable Approach will inform this chapter.

### **Chapter 3: Research Design and Methodology**

This chapter covers the research methodology which encompasses the research design; the population; sample frame; sampling techniques; sample size; data-gathering procedures; data-gathering instruments; data-analysis strategies; and ways to ensure validity and reliability; plans for pilot studies or testing of data-gathering instruments and ethical considerations.

### **Chapter 4: Research Findings**

In this chapter data is presented, interpreted and analysed. Key findings are discussed in relation to emerging themes and sub-themes.

### **Chapter 5: Conclusions and Recommendations**

This chapter gives the study outline, reviews; conclusions are drawn, and recommendations are made.

The work plan for the research is presented in Table 6.1 below.

**Table 1.1: Time Framework: Research Schedule**

<b>Month/Year</b>	<b>Description</b>	<b>Outcomes</b>
April 2019	Setting the pace for an inquiry	1) Conception of ideas 2) Background reading
May – June 2019	Writing of Proposal and Literature Review	Research Proposal
July 2019	Submission of Research Proposal	Approval of the research proposal
Beginning of August 2020	Construction of Research Tools	1) Informed consent 2) Interview guides
December 2020 - January 2021	Field Work	Conducting Interview
September – October 2019	Data sorting, processing and analysis, writing up chapters	1) Identify patterns and themes

<b>Month/Year</b>	<b>Description</b>	<b>Outcomes</b>
	for dissertation and handing in first draft.	2) Submit Chapters to Supervisor 3) Complete corrections
February 2021	Final submission of the dissertation	Final Dissertation

## **CHAPTER 2: LITERATURE REVIEW AND THEORETICAL FRAMEWORK**

### **2.1 Introduction**

This chapter reviews literature relevant for the study. The literature review involves collation and synthesising information on climate change that is relevant to the study. Therefore, literature on climate change and key variables such as gender, agriculture and natural resources is reviewed and summarised in this chapter. This chapter also presents the theoretical framework underpinning the study. The Sustainable Rural Livelihoods Approach (SRLA) is therefore presented and discussed in relation to climate change and its impact on women in semi-arid rural areas as found in Mbire District in Zimbabwe. The theoretical framework provides the basis upon which the study findings will be analysed. The chapter also provides definitions of key and recurrent terms used in the study to provide clarity and uniform understanding and interpretation of the terms.

### **2.2 Understanding Climate Change**

Karmaoui (2019:27) defines the concept of climate change as the long-term change in precipitation and temperature. These two parameters are the main factors controlling the repartition of ecosystems, species and ecosystem services. It is currently recognised that the industrial revolution has contributed to the combustion of billions of tonnes of fossil fuel in order to produce energy for the last 150 years. This in turn has steadily raised the concentration of carbon dioxide in the atmosphere. Karmaoui (2019:27), indicated that the threats to the environment due to climate change include air pollution, over-exploitation of natural resources, and erosion of biodiversity. Globally, climate change affects the lives of more than six billion people through its impact on soil, water, and air pollution, industrialisation, urbanisation, deforestation, burning and overuse of natural resources.

According to FAO (2018), the effects of climate change are already being felt across the globe and on the diversity of flora and fauna. Oceans are getting warmer and sea levels are rising. Drought seasons are becoming longer and becoming more intense thereby threatening freshwater supplies and crops, and increasing global food insecurity. Extreme weather conditions are damaging infrastructure, wiping out harvests, compromising fish stocks, eroding natural resources and endangering species. Thus, the livelihoods of farmers, fishermen and foresters, who have contributed least to climate change, are being threatened. Furthermore, FAO (2018) states that climate change will disrupt the livelihoods of millions of

rural people who depend on agriculture for their incomes. Inadvertently, climate change will also expose both urban and rural poor to higher and more volatile food prices. Inevitably, it will cause distress migration and jeopardize progress towards the Sustainable Development Goals (SDGs).

Most developing countries depend on rain-fed agriculture and natural resources to sustain the livelihoods of their citizens. Both agriculture and natural resources are susceptible to the effects of climate change. According to Chirisa and Mabeza (2019:208), the *El Nino* dry weather conditions experienced in Southern Africa, including Zimbabwe cannot be ignored. The presence of *El Nino* can negatively influence weather patterns, rainfall patterns, ocean conditions and fisheries. For example, in Mbire District, fisheries can be affected thereby posing economic hardships for the communities; especially women depend on fish for consumption and sale for economic survival.

The *El Nino* refers to the largest scale ocean atmosphere climate interaction linked to a periodic warming in sea surface temperature across the central and east equatorial pacific (Chirisa & Mabeza, 2019:208). The *El Nino* effect happens when ocean temperatures and rainfall from storms off South America warm up due to less upwelling of cold water from below to cool the surface. The clouds and rainstorms associated with warm ocean waters shift towards the east. The warm water releases so much energy into the atmosphere that affects weather changes all over the planet (Chirisa and Mabeza, 2019:208).

In the Mbire District, climate change has negatively affected the socio-economic livelihoods of the rural women. Rainfall for optimum crop production is inadequate due to the short rainy season; the rainfall pattern has changed; and the high temperatures and extreme heat is destroying their livestock and crops. The villagers of Mbire District are still suffering the aftermaths of the 2015 floods that have resulted in chronic food insecurity among households, especially the poor. Human and wild-life conflict has become more prevalent with livestock; field crops and vegetables gardens being devoured by wild-life and lives being lost due to these conflicts. Women are mostly affected because of the roles they play in managing livelihoods of most homesteads. They walk long distances to fetch water every day, spend many hours in the fields tending to crops, and cook for the families as well as perform other domestic duties, such as attending to the sick and those affected after natural disasters such as floods and storms.

### **2.2.1 Climate change and gender**

Climate change affect people differently depending on the nature of their vulnerability and role in the society. Climate change effects aggravate the inherent inefficient agricultural production system in the semi-arid regions resulting in continued poverty, marginalization of women through limiting available social and economic opportunities, and malnutrition among children in rural areas, as well as increased migration from rural to urban areas (Dankelman, 2017:3). United Nations Women (2017), observed that shocks such as droughts and floods caused by climate change increased work burden for Mozambican women and girls, and also resulted in early marriages in girls, leading to lost childhood, education and other useful opportunities.

Under similar circumstances of droughts and floods, the United Nations Women (2015) also observed that women and girls face greater health and safety risks as water and sanitation systems become compromised; they are often the last to eat or be rescued; and they take on increased domestic and care work as resources dwindle. In most rural areas, girls and women are primarily responsible for managing food and water of the families. Therefore, their roles become very difficult as production of food and supply of water are compromised.

### **2.2.2 Climate change and natural resources**

The climate change effects of increased frequency of droughts and floods and extreme temperatures have a bearing on the availability of natural resources (wildlife, water, firewood, timber and non-timber forest products). Rural communities, such as the Mbire District, heavily depend on these natural resources as safety nets, especially in times of shocks, such as droughts, floods, and bereavement in families (Mazara, 2017).

Matema (undated), notes that, for many years, the population in Mbire District in the Mid-Zambezi Valley of Zimbabwe has been expanding rapidly and has gradually encroached on large wilderness areas with abundant populations of wildlife. Mbire District represents a region of contrast and conflicts of wildlife versus humans, wildlife versus livestock, wildlife versus crops and livestock versus crops. The limited supply of non-timber products such as wild fruits and vegetables, and water is likely to escalate human-wildlife conflict in areas such as Mbire District where wildlife still exists in relatively high numbers. Matema (undated), urges that water is a significant in determining settlement and agricultural

productivity, and this explains why there are human settlement along the riparian zones of major rivers. According to FAO (2010), riparian zones are important for wildlife as habitat as they provide both forage and water.

Availability of even wild fruits, livestock, crops and water for human consumption will be a challenge because of the conflict between humans and wild animals. African Wildlife Foundation (AWF) (2018) urges that climate change has slowly affected wildlife through changes in habitat composition, forage availability as well as access to water as weather patterns change. For example, one elephant can use up to 150-300 litres per day for drinking, bathing and spraying water on their bodies to cool down. The dwindling water supply will therefore negatively affect the survival of elephant populations as well as other wild animals in the district.

The AWF (2018) further explain that human-wildlife conflict takes various forms outside protected areas from livestock predation, poaching, , and crop destruction to habitat encroachment. Climate change impacts like droughts, habitat loss and spread of diseases has led to increased conflicts in wildlife areas. Fishery business for the economic survival of families in Mbire District will be affected as the fish population deteriorates due to the receding water levels in the Hunyani River. The river is drying up due to increasing evaporation and that will have a direct negative effect on the socio-economic livelihood of the rural women in the semi-arid region of Mbire District. The fishery business has also been affected as wild animals and human-beings scramble for water resources. Crocodile and Hippopotamus attacks have taken lives of mostly women, who engage in fishing as a means of livelihood for their families.

### **2.2.3 Climate change, women and agriculture**

According to the UNDP (2012), women play a pivotal role in the three components of food security: food availability (production), food access (distribution), and food utilization. Women also play a dominant role in a wide range of activities that support agricultural development, such as soil and water conservation, afforestation and crop domestication. Although men also play a crucial role in food production, they tend to face far fewer constraints than women.

Men are more likely to have access to productive resources such as land, extension services, and credit. When harsh climatic conditions result in crop failures, culture often makes it easier for men to leave their farms in search of employment elsewhere, leaving women behind to struggle to feed their families to make ends meet. In many cases, women have liquidated their assets and resources in crisis situations to ensure family survival.

According to the WHO (2009), girls and women are generally expected to be care givers in the home with the results that they have limited time to engage in other activities including income generation and education. This, coupled with the rising medical costs associated with family illness, heightens levels of poverty, especially in female headed households. In turn, poverty is a powerful determinant of health. It also follows that women may have less time to contribute to community-level decision-making processes, including on climate change and disaster risk reduction. In addition, being faced with the burden of caring for dependents while being obliged to travel long distances to fetch water and firewood makes women and girls prone to stress-related illnesses and exhaustion.

Furthermore, the WHO (2009) indicates that women and girls typically have limited access to health-care services due to poor control over economic and other assets. Women also face cultural restrictions on their mobility thereby limiting their ability to travel to seek health care. Increased time spent collecting water for domestic use means a decrease in available time for education and places women and girls at risk of violence when travelling long distances. Women also tend to have comparatively lower education status than men further constraining their access to health information or early warning systems. This also means that girls and women have decreased access and opportunities in the labour market, increased health risks associated with pregnancy and childbirth, and less control over their personal lives.

According to the WHO (2009), elderly women suffer from stress and fatigue due to heavy family and caring responsibilities. These responsibilities also prevent their availability for wider social and economic participation. Their incomes may be low because they can no longer take on paid work or other forms of income generation. The WHO (2009) stresses that chances are that elderly women may have inadequate understanding of their rights to access community and private-sector services. Even when they are aware of these services, nominal financial resources for clinic visits and drugs may be out of their reach. Access is further

restricted for older women and older men living in rural areas, who are often unable to travel the long distances to the nearest health facility.

The analysis of how the socio-economic livelihoods of rural women are being affected by consequences of climate change is very important as women play an important role in rural socio-economic livelihoods in semi-arid region of Mbire District in Zimbabwe. It is also important to gain an understanding on how they are coping with the negative effects given that these remote communities still practice and observe traditional practices and have rich indigenous knowledge. It is also important to examine if they are using indigenous knowledge as a way of adapting to climate change effects as IKS has helped to sustain indigenous communities for generations; it is highly possible that it can help sustain the future livelihoods in the communities.

According to Nakashima, Krupnik and Rubis (2018), IKS is the knowledge that the community has accumulated through years of interacting with the environment (land, water, air). It includes the knowledge of what type of rainfall is expected based on the movement of the clouds, plants and temperature changes. Indigenous knowledge, like any other type of human knowledge is never static; it evolves as times and seasons change.

### **2.3 Sustainable Rural Livelihood Approach**

This proposed study will deploy the concept of Rural Sustainable Livelihood Approach (SRLA) to examine the effects of climate change on socio-economic livelihoods of rural women in semi- arid region of Mbire District. Small (2011), points out that beginning in the 1990a, the SRLA became a mainstream international development approach in rural development studies. Based on the studies of the rural poor, the SRLA combines participatory, bottom-up-approaches with recognition of the impact of macro-level governance, policies and institutions. Furthermore, Small (2011), denotes that even though the SRLA has been used primarily in countries referred to as developing or in transition, this approach is now currently in use in poverty reduction programming in the United Kingdom and Canada. These countries have used the concepts from the SRLA in a dialogue with rural citizens about their priorities for government action.

Krantz (2001), indicate that there are three insights into poverty which underpin the SRLA. The first is the realization that the relationship between economic growth and poverty

reduction is dependent on the ability of the poor to take advantage of expanding economic opportunities. Secondly, there is the realization that poverty includes a wide variety of aspects beyond low income to include other dimensions, such as, bad health, illiteracy, lack of social services, state of vulnerability and feelings of powerlessness in general. Finally, it is now acknowledged that the poor themselves are aware of their situation and know what they need to improve their welfare. As a result, they should be involved in the design of policies and projects intended to better their lot.

McNamara and Morse (2013:17) urge that the SRLA can be defined as a means of making a connection between people's day-to-day lives and by the means they can sustain all this into the future without damaging anyone else's prospects along the way. This approach is an analysis of people's current livelihood and what is needed for enhancement and useful in avoiding moral degradation and dysfunction. Neefjes (2000:82) stresses that a person or family's livelihood is sustainable when they can cope with and recover from stresses and shocks and maintain or enhance their capabilities and assets both now and in the future, without undermining environmental resources.

The livelihoods approach is based on the premise that the options available to the poor are based on their asset status. According to Sati and Vangchhia (2017:97), the SRLA has five forms of capital: natural, human, financial, physical and social capital. Sustainable livelihoods lead to poverty reduction and include development of all the five livelihoods/assets. Sustainability of livelihoods is also dependent on institutional support and the vulnerability context. These aspects can reduce poverty and enhance socio-economic livelihoods of everyone especial the rural women in the semi-arid regions of Mbire District in Zimbabwe.

Sati and Vangchhia (2017:99) noted that the SRLA is an important tool for poverty reduction, especially in the wake of growing food insecurity and malnutrition. In the developing economies where population size is large and food production patterns are unsustainable, many households are affected and suffer from poverty and malnutrition. Sustainable livelihoods can be achieved through developing and improving farming systems given the increased dependence on agriculture in these societies. Livelihoods can be protected through strategies that focus on enhancing and diversifying livelihood options that have a larger impact on the socio-economic development of households.

Sati and Vangchhia (2017:101), further indicate that agricultural practices are largely associated with socio-economic development and livelihood strategies in most developing world. The practices include cultivation and development of foods and vegetable crops. Since there is lack of development in the industrial sector and in the area of science and technology, these developing countries rely mainly on cultivating subsistence crops for food requirements and other socio-economic aspects.

The SRLA is suitable for my study because it clearly indicates the relationship between rural communities and their environment. It clearly points out the effects of climate change on the socio-economic livelihoods of women in Mbire District as poverty and malnutrition is inevitable in the region and women are affected the most because of their dominant role in managing households and their socio-economic livelihoods. The basic argument is that the quality and sustainability of livelihoods depend on the strategies people develop to manage their capital assets, which are by and large under their control, within an environmental context.

## **2.4 Clarification of key terms**

### **2.4.1 Climate Change**

According to IPCC (2011), climate change refers to a change in the state of the climate that can be identified (e.g., using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity. However, the usage differs from that in the United Nations Framework Convention on Climate Change (UNFCCC) (2011), where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods. In this case, climate change has negatively affected the socio-economic livelihoods of rural women in the semi-arid region because agriculture is the backbone of their well-being.

### **2.4.2 Socio-economic development**

According to Jaffee (1998:3), socio-economic development refers to the ability to produce an adequate and growing supply of goods and services productively and efficiently to

accumulate capital and to distribute fruits of production in a relatively equitable manner. Socio-economic development involves production, accumulation and distribution process. The study of development has been heavily influenced by particular sociological concepts and economic measures.

### **2.4.3 Rural women**

Rural women are active agents of social and economic change and environmental protection who are, in many ways and to various degrees, constrained in their roles as producers, farmers, caregivers, investors, and consumers (United Nations, 2012). Rural women play significant roles ensuring nutrition and food security, eradicating rural poverty and improving the well-being of their families. Despite their crucial role, women continue to face serious challenges as a result of gender-based stereotypes and discrimination that deny them equitable access to opportunities, resources, assets and services.

### **2.4.4 Livelihoods**

Livelihoods refer to a means of living which comprises of assets (stores, resources, claims), capabilities and access to activities. The important feature of this livelihood definition is to direct attention to the links between assets and the options people possess in practice to pursue alternative activities that can generate the income level for survival (Ellis 2000:7).

### **2.4.5 Semi-arid regions**

According to FAO (2019), semi-arid climate or steppe climate is the climate of a region that receives precipitation below potential evapotranspiration, but not as low as a desert climate. Semi-arid regions are characterized by a scarcity of water, which affects both natural and managed ecosystems and constrains the production of livestock as well as crops, wood, forage and other plants and affects the delivery of environmental services. Kahinda, Rockstrom, Taigberu and Dimes (2007) indicate that in semi-arid regions the rainfall has extreme temporal and spatial variability and generally occurs as storms of high rainfall intensity, resulting in agricultural droughts and intra-seasonal dry spells that reduce the yield of rain fed agriculture. Statistically, severe crop reductions caused by an intra-seasonal dry spells occur once to twice out of 5 years, and total crop failure caused by annual droughts once every 10 years.

## **CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY**

### **3.1 Introduction**

This chapter discusses the research methodology followed in gathering data for the study. The study population, sample and sampling techniques used to identify and select research participants are discussed. The data collection instruments, data source, data collection methods used in this study are also presented. This chapter also discusses the how the data was analysed and highlights the ethical considerations that were observed during the research.

### **3.2 Research design**

Research design is defined as the research plan outlining the research methods selected for collecting data. These methods could include conducting interviews, surveys, and/or experiments, as well as observations (Vogt, Gardner & Haefee, 2012:3). This exploratory research and case study design was selected to establish how climate change affects the socio-economic livelihoods of rural women in semi-arid regions of Mbire District in Zimbabwe. The exploratory research design enables the researcher to explain the problem under study and answer the “why and how” questions, by establishing causality and outcomes (Bhattacharjee (2012:6). The exploratory research design is employed in this study as it enables the researcher to understand the vulnerability of women to the effects of climate change and the various ways in which they are affected. The case study design further offers the researcher the opportunity to have an in-depth understanding of the phenomenon under study through probing and analysis (Tshuma 2013:118).

The study was carried out with women of fifty-five years and above from different villages, such as, Chibvongodze, Masoka, Mahuwe and Kamwanza surrounding Mushumbi Pools Growth Point where most of the government offices are located in the Mbire District using semi-structured questions which brought out a broad spectrum of the effects of climate change on their socio-economic livelihoods of rural women as a case study.

### **3.3 Research approach**

Social research studies typically employ quantitative, qualitative or mixed methods approaches. The quantitative approach relies on gathering numeric data from large samples while qualitative approaches focus on gathering in-depth information from small purposively

selected samples. Some studies combine the two approaches to benefit from the strengths of each approach while minimising their shortcomings. This study adopted a qualitative approach. This approach focuses on the perceptions of individuals and how they interpret their experiences and events in their natural contexts in order to obtain a deeper understanding of socio-economic challenges t faced by women in Mbire District. Qualitative research studies rely on the uniqueness of the individual and gather information through techniques such as observations, interviews and case studies (Taylor, 2005:240). Both focus group and personal interviews were carried until saturation of data, which is when additional data is no longer generating any new information.

### **3.4 Study population**

A population is a group or elements, events or objects that share one or more characteristics. Based on this definition, a sample is described as a subset of the population. It can be referred to as a group of individuals that represent the broader population (Washington, Cunningham & Pittenger, 2010:72). With regards to the research, women from the age of fifty- five years and above constituted the study population.

#### **3.4.1 Sample frame**

According to Wheeldon and Ahiberg (2012:59), a sample frame constitutes of as a list of all members of the group who that forms part of the study population. The sample frame guarantees that sample structure is satisfactorily comprehensive and accurate by including all components that are individuals from the objective populace and excluded components that are not individuals from the objective populace (Currivan, 2011). The sample frame for the study comprised of all women aged fifty-five years and above, from Mahuwe, Masoka, Chibvongodze and Kamwanza villages within Mbire Rural District Council; district officials , officers from the Zimbabwe National Parks and Agriculture Extension Services; and local leadership, namely, the Councillor and the Headman.

#### **3.4.2 Sampling techniques**

The two sampling techniques used to select study participants are purposive/judgment and snowball sampling. With purposive sampling, elements are deliberately selected based on subjective criteria (Rubin and Babbie, 2010:357). This sampling strategy enabled the researcher to select participants with relevant information of value to the study (Yin 2011:88). In this study, the women selected for the study had to be aged fifty-five years and

above with indigenous knowledge of how the climate has changed over the years. The snowball sampling technique involves the researcher requesting the participants to suggest or recommend individuals that might have valuable information to participate in the study (Onwuegbuzie & Collins, 2007:286; Bhattacharjee, 2012:70; Yin, 2011:89). Once the initial research participant is identified, snowball sampling is used to identify additional research participants through referrals (Rubin & Babbie, 2009:146). The seven women who participated in the focus group discussions and the three women participated in the face-to-face or personal interviews were all from different villages and were identified through snowball sampling. Thus, the advantage of snowball sampling is that it expedites access to informants that the researcher would find by themselves (Bhattacharjee, 2012:70).

### **3.4.3 Sample size**

According to Channels (1985:106), the purpose of the sample size is to establish how large the sample from a particular population must be in order to be representative. The sample size for the study comprised of ten elderly women as participants with the age range from fifty-five years and above. The seven participants that participated in the focus group discussions were aged between fifty-five years and sixty-five; and three participants who were seventy years and above were involved in individual face-to-face interviews. In qualitative studies sample sizes are generally small and not representative of the population but they provide in-depth information regarding the phenomena under study.

## **3.5 Data-gathering procedures**

The various aspects of the data collection process include data collection instruments, data source and data collection technique used. The researcher collected both primary and secondary data.

### **3.5.1 Data gathering instruments**

The primary data was collected from individuals during face-to-face interviews conducted with the aid of a semi-structured interview guide. The interview guide was composed of open-ended questions to allow the participants to express themselves without any restrictions and to state their responses based on their own experiences. The interview guide was divided into six sections. The first section was on background information; the second section focused on perception or understanding of climate change; third section, household income activities; fourth section, natural resources and wildlife utilization; fifth section, human

wildlife conflict and the sixth and last section focused on the measures in place to mitigate negative climate change effects.

The focus group discussions conducted with seven participants were also guided by a semi-structured guide with open-ended questions to allow the women to share their experiences, perceptions, and emotions. All the interviews and discussions with participants were audio-recorded to ensure accuracy of the information gathered.

A calendar was used to keep track of the dates and times of the meetings with individuals and group meetings. The pocket diary was used for jotting down notes during the interviews and discussions, as well as observations by the researcher. Diary data is typically designed to summarise activities across different time timeframes (Belli, Stafford & Alwin, 2009:16). A flip chat was used during the focus group sessions to record important points raised during the discussion. A camera was also used to capture all the visuals relevant for the study during the observing period.

The interviews with the key informants were also recorded by a tape recorder. The personal interviews were conducted to have an in-depth understanding of the effects of climate change on the socio-economic livelihoods of rural women in the semi-arid region of the Mbire District in Zimbabwe. Face to face semi-structured interviews were conducted for the women to share their experiences. The face to face interviews allowed the interviewer and interviewee to spend dedicated time together to establish rapport that could enable the interviewee to share information required for the study (Roller & Lavrakas, 2015:58).

### **3.5.2 Data sources**

Secondary data was collected from the recorded data of causalities from human and wildlife conflicts, rainfall patterns and the sales of livestock from Mbire District. Secondary data refers to data already available and publicly accessible (Bhattacharjee, 2012:39). In the event that the cost of gathering primary data is prohibitive, secondary data may be equally useful if available at a level that is suitable for answering the researcher's questions (Bhattacharjee, 2012:39). It was of paramount importance for the researcher to obtain information as it would provide more answers to the research questions.

### **3.5.3 Data collection techniques**

That data for the study was gathered through the use of various tools. These include interview guides for face-to-face, key informant and focus group discussions. As argued by Bridgemohan (2001:11), using multiple methods and data sources provides an opportunity to triangulate and verify information.

#### **3.5.3.1 Face-to-face interviews**

Face-to-face interviews were conducted with the individual women aged seventy years and above and were guided by the semi-structured interview guide that was developed in line with the research questions and literature review. In qualitative research, interviews are facilitated conversations that encourage the participants to recount their own experiences and reality from their own perspectives (Yin, 2011:32).

The researcher used the qualitative interviews to enable the participants to use their own words and derive meanings to their own lives and experiences. This approach generally provides an opportunity to gather detailed information pertaining to participants' experiences and viewpoints on a particular topic (Turner, 2010:754). Thus, in order to benefit from this approach, the researcher requires good listening skills in order to gather and document what the participants' experiences (Yin, 2011:135).

There is need for preparation before conducting interviews with participants. According to Turner (2010:757), there are eight principles that should be adhered to in order to have clarity and a clear focus when preparing to conduct interviews. These principles are stated as follows: selecting a setting with minimum distractions; explaining the purpose of the interview to the participants; addressing confidentiality issues; explaining how the interview would be conducted; indicating the expected duration of the interview; informing the participants how they could contact the researcher after the interview; asking them if they have any questions before the start of the interview; and ensuring that the interview is recorded so that the researcher does not only rely on his or her memory to recall the respondents' answers (Turner, 2010:757).

The interviews with individual participants were carried out in their households in different villages. The researcher personally went to their homes and interviewed them. This was in recognition of their advanced age (seventy years and above) and therefore, this saved them

the trouble of walking to Mushumbi Pools where a venue had been secured for the focus group discussions. The interviews with all the participants were carried out in peaceful, quiet environments and they were recorded using a tape recorder.

The researcher observed all relevant COVID-19 protocols. Before the interviews, the researcher made sure everyone had a mask, had sanitized, and had their temperature checked. The researcher then introduced herself to the participants and explained the purpose of the interview. During interviews social distancing was practised between the researcher and participants.

Before conducting the interviews the researcher described to the participants how these would be conducted. The researcher indicated that she would ask a series of questions and the participants would be given the opportunity to answer each question and where necessary the researcher would ask follow-up questions to get more details. Each interview was expected to last for between 30 and 45 minutes. The participants were given the opportunity to ask the researcher any questions relating to the study at any time. The researcher also indicated to the participants that after the study they could also contact her should they have any questions or further information regarding the study. Finally, the researcher requested and was granted permission by the participants to audio record the interviews to ensure that all information was collected verbatim. The researcher also reassured the participants that the confidentiality of all information gathered will be guaranteed.

#### 3.5.3.2 Focus group discussions

The focus group discussions were conducted the same as the individual personal interviews using the standardised guiding semi-structured questions. In line with the assertion by Bhattacharjee (2010:40) that focus groups are suitable for use in exploratory research, the focus groups were conducted to gain an understanding of regarding the effect of climate change on the socio-economic livelihoods of rural women in the semi-arid of Mbire District.

According to Onwuegbuzie *et al.* (2009:3) there are various aspects necessary to enhance the effectiveness of focus groups. This includes having an optimum group size (between 6 and 12 participants) and allocating sufficient time (between 1 and 2 hours) for discussion. The group composition should also be such that a diversity of ideas and information can be shared with all participants feeling free to express their views and beliefs ((Onwuegbuzie *et al.*, 2009:3

Despite the focus groups being a suitable method for the study, it has its downside. For instance, the results from a focus group cannot be generalised to other settings, particularly because of the small samples sizes from which information is gathered (Onwuegbuzie *et al.*, 2009:2). There are several advantages for using focus groups as a data collection method. Focus groups are a cost-effective and quick way of gathering large amounts of information from multiple participants (Onwuegbuzie *et al.*, 2009:2). By their nature, focus groups create a sense of belonging among participants which enables them to share their views without any fear. Furthermore, participants may relate in a manner that can lead them to discuss common challenges they face with the possibility that they may developed solutions to these shared problems (Onwuegbuzie *et al.*, 2009:2).

For this study, a group of seven (7) women from different villages and wards was constituted for the focus group discussion. . The eight principles identified by Turner (2010:757) and discussed earlier were adhered to in preparing for and conducting the focus groups. The venue at The Mbire District Centre was conducive and the climate was favourable to conduct effective discussions with the participants.

#### 3.5.3.3 Key informants and secondary data

Data for the study was also obtained through key informant interviews with officials from the Zimbabwean National Parks, Agriculture Extinction Services and the Mbire District Council. The guiding semi-structured questions from the study made it possible to obtain the data that was relevant to have a deep insight of the socio-economic livelihoods of the study participants. These officials also provided records and documents on relevant issues such as rainfall patterns, statistics of deaths due to human-wildlife conflict, and livestock sales in the Mbire District.

The study also relied on secondary data to answer the research questions. The advantages of secondary data are that it is already available and can be easily accessible to researchers (Berg, 2001:258). Furthermore, secondary data eliminates the challenges associated with interacting with participants during data collection. The downside of secondary data is around its relevance or availability in the format desired by the researcher and suitable for the study. (Berg, 2001:108). However, this challenge can be addressed by utilising secondary data as background data and to augment primary data collected for the study (Berg, 2001:118).

### **3.5.4 Data analysis strategies**

According to Harding (2013:9), qualitative data analysis consists of cutting data up and reorganising it again in a manner that seems relevant and meaningful to describe a phenomenon and what it means. Furthermore, Saldana (2013:58) indicated that coding is the arrangement of elements in a systematic order or classification. In other words, coding enables one to organise a group of similarly coded data that share the same characteristics. Coding involves the reduction of data into meaningful segments and arranging these segments into categories (Creswell, 2007:148; Dey, 2005:59). Qualitative analysis involves labeling and coding of data to reveal the similarities and differences so they can be recognized.

In this study the thematic content analysis was used to analyse the qualitative data gathered through the interviews and focus group discussions. According to Kumar (2011:248), thematic content analysis involves the analysis of qualitative information to identify emerging themes. The process follows a number of steps as follows: (i) identifying the main themes, (ii) assigning codes to the main themes, (iii) classifying the interviewees' responses under these main themes; and (iv) integrating the themes and responses into the text of the report (Kumar, 2011:248). In conducting thematic content analysis, emphasis placed on making sense of phenomena under study. (Bhattacharjee, 2012:113).

The thematic content analysis method provides a nuanced understanding of the primary data gathered through qualitative methods, such as, face-to-face interviews and focus groups. The thematic content analysis was conducted in three steps. The first step entailed transcription of audio recordings of interviews, both face-to-face interviews and focus group discussions. The second step entailed coding of transcripts into themes. The third step focused on making comparisons within the themes. These steps are further discussed in detail below.

#### **3.5.4.1 Transcription of interview audio recordings**

Transcription of audio recordings was conducted to enable handling of the research data. The researcher performed this process by listening to the audio recordings and manually typing out the content into text form. The interviews were conducted and recorded in Shona, which was the preferred language of the participants. As such, the researcher had to decipher the interviews and simultaneously translate and type them out in English. In total there were 10 recordings from the face-to-face interviews with 45 minutes worth of content; and one audio

recording for the focus group with 2½ hours of content. The audio recordings were transcribed into volumes of pages of data in text form and then prepared for the second step of analysis which involved coding into specific and identifiable themes.

#### 3.5.4.2 Coding of data and development of themes

The coding process involved the researcher reading and re-reading the transcripts to identify patterns. This included classification and categorisation of text data segments into sets of codes or categories in relation to research questions (Bhattacharjee, 2012:113). These themes or codes were in the form of consistent phrases, expressions, or ideas that were common among research participants (Turner, 2010:759).

The coding identified three themes that related to: (i) effects of climate change on the socio-economic livelihoods of rural women in the semi-arid region of Mbire District, (ii) the adaptations or coping mechanisms that can be implemented to mitigate effects of climate change, and (iii) the likely interventions by foreign and local aid organisations to address the effects of climate change on the socio-economic livelihoods of rural women in the semi-arid region of Mbire District.

#### 3.5.4.3 Comparison of the themes across data sources and data collection techniques

In this step the researcher compared the emerging themes across data sources and data collection techniques. This was performed through analysing the codes for their similarities and differences. This step also involved identifying and documenting verbatim quotes from participants' responses in the transcripts that could be used to highlight key messages. This is necessary to ensure that the gist of the participants' views is retained and expressed without alteration (Kumar, 2011:249).

#### 3.5.4.4 Interpretation of data

According to Dey (2005:41), the classification of data into codes and themes forms the basis for the interpretation and explanation of data. It is the role of the researcher to develop "a meaningful and adequate account" of the meanings of the data (Dey, 2005:41). Therefore, in this study the researcher provided interpretations of the data and gave explanations to support the codes and themes that emerged from the analysis. The researcher used the theoretical lens of Sustainable Rural Livelihoods Approach (SRLA) to derive meanings from the data. The SRLA is discussed in Chapter 4.

### **3.5.5 Validity and reliability**

According to Thyer (2010:356), reliability is the extent to which a data collection procedure and analysis yield the same answer for multiple participants in the research process. Reliability is the consistency of measurements of a concept using an identical measurement procedure and the replicability of the findings. Furthermore Thyer (2010:356) denotes that, reliability is dependable on the resolution of both internal and external research design. Internal reliability refers to the degree to which other researchers given a set of previously generated constructs would match them with the other data the same way he/she did with the original data. External reliability addresses the issue of whether independent researchers would discover the same themes or generate the same construct in the same or similar settings.

Validity refers to the process of ensuring quality in measurement, confirm expected relationships between variables and provide scope for generalising findings (Baumgarten, 2010:4). Nonetheless, qualitative research specialists do not anticipate getting indistinguishable outcomes over and over again as they trust that the study about changing elements. Furthermore, Thyer (2010:367), posits that in qualitative studies validity refers to the credibility and truthfulness of the study findings and places responsibility on the researcher to provide evidence and explanations that are plausible and credible.

According to Lodico, Spaulding and Voegtle (2010:39), credibility is measured in relation to the extent the participant's perceptions of phenomena under study match up with the researcher's report. In other words, has the researcher accurately captured participants' thoughts, feelings and actions and the processes that influence these? On the other hand, Brown and Rogers (2003:242), denotes that objectivity is defined as the observation of an object as it actually is rather than as it exists just in the mind of the person making the observations. Objectivity is usually contrasted with subjectivity. However, even objectivity is a relative concept, which depends on the scale of observation.

The issue of validity and reliability was thoroughly executed during the research through the collection of the data from the relevant participants that were the women of Mbire District that witnessed the change of climate over the years. Their advanced age of fifty-five years and above and the duration of the years they lived in Mbire District made the data valid and reliable. All the women participants who were interviewed during the data collection had

more than fifty years residing in Mbire District which implies that the data collected was trustworthy.

### **3.5.6 Plan for pilot studies or testing of data-gathering instruments**

Seidman (2006:39) suggests that pilot studies should be conducted prior to the actual data collection process to test the interviewing design with a small number of participants. This will enable researchers to confirm the appropriateness of the research structure and perform any necessary revisions. For this study, a pilot exercise was conducted to practice communication and listening skills with participants and aim to minimise the chances of influencing participants during the actual research. A pilot study was conducted with family members as a way of coming up with feasible ways of carrying out the actual research and testing if the research structure is applicable to the participants. The researcher also took the pilot as a platform to gain research experience. Furthermore, the researcher took this as an opportunity to test her technical skills on how to operate the tape recorder for recording the interviews and focus group discussion.

According to Yin (2011:37), a pilot study enables the researcher to test and refine relevant aspects of a final study. For example, the pilot study might show that fieldwork procedures revision, data collection instruments may need rephrasing and analysis plans might require revising. During the pilot study the researcher practiced how to lead the interview, reading out the interview questions, practicing eye contact during the interviews and gathering the confidence of interviewing individuals, groups and other stakeholders. The pilot study assisted the researcher to have a better understanding of how to effectively conduct the interviews in order to unravel the effects of climate change in rural areas and the socio-economic livelihoods in semi-arid regions.

According to Sim and Wright (2002:72), pilot testing of the data collection instrument might help to identify problems that can occur during the actual interviews, such as missing items, poor wording leading to inappropriate response options, and unclear instructions. The researcher was also able to read out the questions and probe for further details. In addition, the researcher was able to operate the tape recorder, mounting the flip chat and the camera settings without facing any challenges. The skills obtained and polished during the pilot study assisted in carrying out the research in a more professional and confident way. Communication skills were efficient and flowing during the interviews with the participants.

The researcher managed to practice eye contact and observing the emotions and facial expressions, gestures of participants during semi-structured interviews as they shared their experiences of climate change and their socio-economic livelihoods.

According to Moore and Cunningham (2017:26-26), effective communication comprises of three elements which are congruency, empathy and non-judgemental. Congruency can be described as being real and truthful, empathy is developed through a process of putting yourself in other person's world and seeing it from their point of view and lastly being non-judgemental is working from the participant's point of view and putting your values and belief aside. The researcher was congruent, empathetic and non-judgemental during the interviews so as to get an in-depth understanding of the participants' perceptions and experiences regarding the effects of climate change on their socio-economic livelihoods.

### **3.6 Ethical considerations**

Mouton (2001:276) claims that analysts should act competently and be answerable to the people when leading research. Blanche *et al.* (2006) indicates four broadly settled philosophical rules that ought to be connected to research to guarantee that it is moral, independent and has regard for the respect for participants. The researcher was mindful of the rights of the participants that include privacy, anonymity, confidentiality, voluntary participation and the right to withdraw, informed consent and the right to not be harmed (Filippa, 2011). The ethical concerns of the study were genuinely regarded as the research included direct human contact. Research ethics mainly look at the interaction between the researcher and the people that are being studied (Mack, 2011:8). Iphofen and Tolich (2018:1) indicate that the research ethics is focused on minimising and eliminating the risk of harm to participants in relation to the potential benefits that may accrue to individuals, groups, community, organisations and even societies from research participation.

#### **3.6.1 Privacy**

Zukauskas, Vveinhardt and Adriuaitiene (201:149), indicated that, it is a requirement for social scientists to respect the participants' privacy and their rights to confidentiality. This principle is derived from the basic human right to decide freely and researchers; promise to guarantee the confidence of maintaining private data in secret. Privacy is about the participants and their right to be protected during and after the research study.

The researcher indicated to the participants that information recorded by the tape recorder and the pictures taken with the camera were not going to be disclosed to anyone outside this study without their consent. Since privacy is for the participants, the study considered protection and ensured the safety of the participants and access to their private data. The researcher assured them of confidentiality and indicated that the recorded data will be kept safe and no one would have access to it except for the researcher and the academic supervisor. According to Nortjie, Visagie and Wessels (2019:239), research participants have the right to be made aware of the privacy and confidentiality regulations and how the project intends to protect their privacy and anonymity and maintain research data confidentiality.

### **3.6.2 Anonymity and confidentiality**

According to Nortjie *et al.* (2019:238), anonymity refers to the process of making sure that the research participant's identity is either never made known to the researcher or masked by the researcher in any research outputs or documents accessible to others. This study thoroughly safeguarded the identities of the participants and their responses from public access and scrutiny. To ensure anonymity, the researcher used pseudonyms or codes to name the participants and made sure the data was confidential.

The confidentiality of data collected and how it was handled is of paramount importance as this gave the participants confidence in the researcher and the research process. According to Wiles (2012:7), in the research context, confidentiality refers to nondisclosure of identifiable information about individuals collected during the research process. Additionally, confidentiality may mean that if participants request that specific information provided in the process of research not be used at all, this will be respected.

Nortjie *et al.* (2019:239), notes that confidentiality refers to the fiduciary obligation of those with access to the private and sensitive information to protect it from unauthorised disclosure, access or use. This obligation applies to all who take part in social sciences research, including researchers, research assistants and field workers, transcribes, translators and independent coders.

The researcher clarified to the participants the precautionary measures that were taken to ensure the confidentiality of their data. Confidentiality is an augmentation of security and is about recognisable information and its preservation in locked up cabinets, locked flash disks

and secured places. It is about who has access to this identifiable data so that the research participants are not left vulnerable but adequately protected from being recognised as research partakers. According to Notjie *et al.* (2019:239), confidentiality of research records, filed notes, written research data, audio-visuals data, and transcripts and so on can be maintained by storing in an access secured physical location such as cabinets, offices, external hard drive and secure online site.

### **3.6.3 Voluntary participation and the right to withdraw**

According to Rubin and Babbie (2009:257), a major principle in research ethics is that participation must be voluntary. No participant should be coerced to participate. Participants should give their consent and be informed of all the consequences of the study before participating. This principle was applied to ensure that participation in the research was voluntary. The researcher clearly indicated to both individual participants and the focus group participants before commencing with the interviews, that they have a right to withdraw if they are no longer interested in the participation. The participants were informed of their entitlement to pull back from the interview during the research if they wish to do so at any point.

According to Opie and Brown (2018:87), participants have a right to withdraw from the research at any time or stage in the research without giving a reason. If a participant withdraws from the research, the data that you have collected involving the participant should be destroyed. Fortunately, all the women that participated in both individual and focus group and key informants, participated in the research throughout the research period. None of them pulled out.

### **3.6.4 Informed consent**

According to Wiles (2012:6), informed consent means providing participants with clear information about what participation in a research project will involve and giving them the opportunity to decide whether they want to participate or not during the research. The researcher indicated to the participants she was a Masters student from Unisa and made them understand the research topic, the purpose of the research and why they were the relevant population sample for the study. The researcher further explained that she had been given permission by the Gatekeeper from the Mbire District Council and also the Gatekeeper of the villages that is the Councillor and Headman.

Once the researcher had clearly explained the purpose of the research and the participants were sure that they wanted to participate, they were given consent forms. They wrote their names and signed as a way of giving their approval for the participating in the study. The researcher also signed the forms to show that we were in agreement. The researcher further explained to the participants what the forms were all about and what they needed to do. The participants were assisted to complete the forms since most of them were elderly and also did not understand English.

### **3.6.5 Do not harm**

Wiles *et al.* (2013:55), stresses that the central elements of ethical research are ensuring the safety and well-being of research participants. So, it is crucial to assess risks that may occur. The researcher should, therefore, assess the risks that might arise and affect the participants' well-being as a result of taking part in a research project. In addition, the researcher must consider the potential risks, both physical and psychological or emotional; including issues, such as, the costs participants incur as a result of participating in research in terms of money, time and inconvenience.

Throughout the duration of the study, no physical, psychological, emotional and verbal harm was caused to the participants. The participants were not exposed to any form of harm as they participate throughout the research. No one was put in direct physical and emotional harm for the benefit of this study. Opie *et al.* (2018:80), denotes that, our role as researchers we have a moral responsibility to ensure that we minimise the risk of causing any harm to individuals, organisations or society. There was a clear indication that the study guaranteed participant of any harm by adhering to the research ethics. Above all, the researcher was aware of her moral responsibility and ethical accountability to the participants.

## CHAPTER 4: RESEARCH FINDINGS

### 4.1 Introduction

This chapter presents the study findings based on the qualitative data collected using semi-structured interview guides with individuals, focus group discussions and key informant interviews. The research aimed at answering the following research questions: a) What are the effects of climate change on the socio-economic livelihoods of rural women in the semi-arid regions of Mbire District? b) What are the adaptations or coping mechanisms that can be implemented to mitigate the effects of climate change? And; what are the likely interventions by foreign and local aid to address the effects of climate change on the socio-economic livelihoods of rural women in semi-arid region of Mbire District.

### 4.2 The experiences of climate change on socio-economic livelihoods of women in the semi-arid region of Mbire District, Zimbabwe.

#### 4.2.1 Has the rainfall pattern changed, that is the onset of the season and ending of the rain season changed over the years?

The women who participated in the interviews as individuals and as part of the focus group and the key informants all noted that the climate has negatively affected the livelihoods of everyone, especially women because they are the ones undertaking socio-economic livelihood activities in most households. The variety of climate change effects mentioned include change of the rainfall patterns, the short rainfall seasons and receding water in rivers, especially the other part of Hunyani/Manyame River as shown on Figure 5.1. Other effects include rising temperatures, violent winds, storms, drought and floods. One individual participant made the statement below.

Individual Participant: *“The rainfall pattern has changed completely; it is no longer raining like it used to in the past. In the past, before the onset of the actual rainfall end of October, there were two rainfalls the first one around August called Bumharutsva and the second one was Gukurahunde Mid-October which would dampen the soil and wash away all the debris remaining in the fields from the previous season and then we would start preparing for the ploughing season. But now, all that is gone.”*

The response below was given by the focus group participant and the rest of the participants also supported by mentioning that:

Focus Group Participant: *“The rain season is now shorter, the rain season is now starting around end of December or beginning of January, then it ends around end of February or beginning of March with very little rainfall that is not enough for our crops to reach maturity level and enough for our livestock to drink.”*

Focus Group Participant: *“The other issue is that, in that short period of the three rainfall months, in the past 2 to 5 years, when the clouds have built up and we could clearly see the sky is saturated, then heavy winds blow the clouds away then it will not rain. Droughts are now frequent compared to the past years, with too little or no rainfall and they are making us prone to hunger and not being able to provide for the livelihoods of our families.”*

Furthermore, the issue of extreme temperatures was mentioned again from both the individual and focus group participants. From the focus group this was stated as follows:

Focus Group Participant: *“The temperatures have changed; the summers are too hot, especially after it rains. After it rains, it becomes too hot and the land dries out, it will not look like it had rained that very same day. These extreme temperatures cause the crops to dry out. For example, the maize cob falls out from the main plant without reaching maturity stage of being harvested and this result in low yields and drought.”*

Group Participant: *“The other problem with this extreme heat is that, even sorghum one of the drought resistant crops at times it gets very hot that it also does not reach the maturity level, it wilts and dies. By the end of the season a family can only harvest one bag (50kg) of sorghum instead of at least about (10 x 50kg)”*

The main issue that was strongly stressed by the participants was the shortage of water to drink, watering their gardens and for livestock. One participant indicated that:

Participant: *“Our boreholes are drying up because of water shortages due to little or no rainfall during the rainy season. The heat is worsening the situation. The water we used to drink from the boreholes is now very salty. Some water in other boreholes is drinkable but from most of the boreholes it is now very salty and hard. We only use it for livestock watering. We can no longer use it for laundry or bathing because it is too salty and hard.”*

Concurring with the participant above this participant indicated that:

Participant: *“We are walking long distances to fetch water from other boreholes which still have fresh water. I walk for about two kilometres to fetch water. It is not easy for an old woman like me. For laundry, we take our clothes and wash them at the river or at the boreholes and fetch water for household use. “*

Another participant concurring with the two participants above indicated that:

Participant: *“Our wells have dried out and soon the boreholes will dry out. The Hunyani river will soon dry out if the situation continues like this. In the past 10 years there were tomatoes and traditional vegetables, such as munyeve and mowa which used to grow along the Hunyani River. We just used to go with our traditional trays to collect the tomatoes and traditional vegetables. The tomatoes were red, juicy and sweet. The river supplied us with fresh water and food. Now we do not even see those tomatoes and traditional vegetables anymore because the river is drying out.”*

Another participant made the following statement:

Participant: *Munyame River used to flow almost throughout the year. We used to go fishing and some people sold some and kept some for-household consumption but now Munyame River does not even have enough water. Some parts of it in Mwanza Village are dry. However, gates/dam wall are opened from Manyame Dam when the river is completely dry so that villagers can have water for household purposes.”*

In support of the issue of the climate change, another group member raised the issue of the change of temperatures during the winter season. She indicated that:

Group Participant: *“When I got married more than 25 years ago and relocated to this area, I gave away all my jerseys to my people back home in Manicaland, the Eastern Highlands of Zimbabwe because the winters back home are very cold and here the winters then were very warm. Now, the winters here are cold that we bought more blankets and jerseys. We even collect more firewood to warm us up throughout the winter season.”*

The indication from the participants from the focus group and individuals is that climate change has had negative effects on the socio-economic livelihoods of the women in the semi-arid region of the Mbire District. Normally, in Zimbabwe there are mid-season droughts or dry spells around January. In the past years these dry spells have been frequent, especially Natural Region 5 where the Mbire District falls under. According to Simba and Juwawa (2017), a dry spell was first defined and used in British rainfall in 1919 as a period of at least 15 consecutive days during which none of the days recorded greater than 0.1 mm of rainfall. Some research work has indicated that depending on the soil depth and retention capacity, dry spells of about a minimum of 10 consecutive dry days cause water stress in many crops thereby reducing yield. Furthermore, shallow rooted crops in low water retaining soils can experience water stress in less than 7 days. Deep rooted crops in high water retaining soils can go for about 15 days before suffering significant water stress. In addition, it was found that dry spells cause most significant water stress in crops during their first 30 days of their life cycles.



**Figure 4.1: The dry section of Manyame/Hunyani River**

It is evident from the results presented above that there have been significant changes in the rainfall pattern and quantity over the years. Rainfall is increasingly become scarce and the seasons have somewhat shifted thereby affecting crop production and ultimately food security in Mbire District. The rivers, especially Manyame River that used to be perennial is now experiencing dry periods with sections of the river completely drying up during the year.

#### **4.2.2 How has violent winds, storms, and floods affected them over the years?**

According to the World Bank (2010), women are disproportionately vulnerable to the impacts of natural disasters and climate change. Globally, existing socio-economic inequalities, such as unequal access to education, decision-making and economic opportunities, increase women's vulnerability to natural hazards such as storms and droughts. There is a direct relationship between women's risk of being killed during disasters and their socio-economic status. The effects of climate change that are being experienced by the women in the semi-arid region of Mbire District are floods, droughts, storms and violent winds. The individual participants and the focus group participants mentioned these problems with the same emphasis as they shared similar experiences. As women these participants play a predominant role in supporting their families through socio-economic strategies and activities. The responses from the participants are stated below.

Individual Participant: *"In the past, the winds we experienced were those ones which would bring the rain and moves the clouds, now there are harsh and destructive winds which are destroying our crops. Hunger is the order of the day because after the storms and violent winds we are left with nothing. These winds break the crops such as sorghum, the cob falls out from the main maize plant and they destroy our homemade silos where we keep our harvested crops."*

Group participant: *"My child, we are having a serious problem with storms or violent winds, our fowl runs, cattle kraals and in our houses where we sometimes store our harvest are being destroyed by these storms. Some of our livestock are killed by these storms, heavy lighting and rain. After these violent winds normally, they are followed by a bad storm that can even wash away all the crops in the fields and uproot even groundnuts and roundnuts from the soils. We experienced this almost every year. I think for the past (uuuuuuuu) ten years or so we are suffering, all this results in hunger and droughts because we will not be left with enough food to last us to the next rainfall season."*

Concurring with what the other group member had shared, another group member added that:

Group Participant: *"We are suffering and our families are suffering because the land that kept us going for the past years does not produce enough for us anymore like it did in the past. These violent winds and storms are causing hunger and droughts. We do not have*

*enough to give to the children and us as well. We need to eat nutritious food for us to be strong and be able to work in the field. Now, even if you have the energy to work in the fields, everything can just be washed away and destroyed. In 2015, there were floods, they destroyed this area. Now we are we are still suffering the aftermath of those floods.”*

Reinforcing the above discussion, another focus group participant indicated that:

Focus Group Participant: *“In 2015, the latest floods we experienced, houses were swept away, trees were uprooted, roads were destroyed, and we thought Hunyane/Manyame Bridge was going to burst because of the amount of the water. All these issues which were mentioned by the other group members resulted in us having little or no food and other necessities to fend for our families. Gardens along Hunyane/Manyame river were washed away and we were left without vegetables to feed our families.”*

Another focus group participant mentioned the issue of worms.

Focus group participant: *“In the past we never had a terrible experience like we have now with different kinds of worms called army worms (tagutapadare) ravaging our crops before they reach the maturity stage. They wilt and die because of these warms. Personally, I believe that the eggs of those worms or the worms themselves were washed away from other places during the floods and landed into our area especially in the fields because they are foreign to our area.”*

In agreement with what the other group member had said, another participant indicated that:

Focus group participant: *“In 2015 when we experienced floods, that is when as well we started noticing different weeds in our fields, the one giving us problems is called (chitsine) black jack, it is not the common blackjack we all know this one is a different species, it multiplies “overnight” and it’s big. Also, another worm called magamba, attacks and destroys the crops, such as sorghum, and maize before they reach the maturity stage, they wilt and die. Also, there are these very small white aphids. They can cover the whole stalk of maize; you can also find them in our vegetable gardens and the plant wilt and die. We did not have these strange zyupakanana (creatures) in the past years.”*

According to a report in The Herald of 17 January 2019 by Daniel Chigunwe entitled: **Storm Leaves Mbire Hunger-Stricken**, villagers in some part of Mbire District were in dire need of food aid following a violent storm which was followed by violent winds that destroyed the homes and food reserves which were affected by the rains the previous week. Furthermore, more than 10 cattle had died from an unknown disease in Ward 16. This situation was frightening for the villagers as it was likely that more livestock could be lost since the disease had not been diagnosed.

It is evident that winds have become stronger and harsh. Flooding episodes have also become frequent and more destructive. The destruction has been experienced in the fields and at the homesteads, including community infrastructure. These occurrences have thus increased the vulnerability of households, and especially women in Mbire District.

#### **4.2.3 What type of livestock do you rear to generate income?**

Agriculture has been a pillar for most of the rural households for many years as they depended on farming for survival and to have sustainable livelihoods. Climate change has caused serious damage to the livelihoods of rural women, especially those in the semi-arid regions of Mbire District because their livestock and crop production have decreased dismally. Livestock and crop production form the backbone of socio-economic activities in most rural households. According to Nkondze (2014), drought, extreme temperatures, floods, storms and violent winds also affected livestock by drying wetlands, pasture land, water resources, streams and decreasing availability of drinking water for livestock. Temperature increase has led to outbreak of new diseases and scarcity of fodder led to change in livestock and crop production patterns.

According to Rust and Rust (2013) agriculture remains the backbone of most African economies. The agricultural sector is the largest domestic producer across Africa and employs between 70% and 90% of the total labour force. In addition, agriculture supplies up to 50% of household food requirements and up to 50% of household incomes. Most of the income is generated by beef cattle, dairy cows, goats, sheep and chickens. Furthermore, Rust and Rust (2013), indicated that together these domestic livestock generate 92% of the total revenue from livestock in Africa. In many rural communities, livestock is the only asset of the poor, but it is highly vulnerable to climate variability and extremes. The impact of climate change is expected to heighten the vulnerability of livestock systems and reinforce existing

factors that are affecting livestock production systems. During the interviews with the individual participants and focus group participants they shared their experiences regarding livestock production and indicated the following:

Participant A: *“The livestock I am rearing are goats, chicken and pigs. I used to rear lots of chicken, but most of them died, I am only left with those three, as you can see my fowl-run is empty. Now that we are approaching September, I am sure I will be left with nothing because they start dying on the onset of summer, September/October because of the heat. The heat is too much and our chicken cannot stand it.”*



**Figure 4.2: One household surviving poultry due to high temperatures**

Participant B: *“The heat is killing our domestic animals, such as pigs, chickens and cattle. We are more worried about our chicken because they die around the summer period from September to October. Other domestic animals die as well but with chicken it is worse because all can die because of this heat.”*

Participant C: *“uuummmm, in the past years this area was not as hot it is now, ever since we started experiencing these high temperatures, all my chickens died, it has been happening since the past few years and I eventually stopped rearing them. I do not have chickens*

*anymore and during this time they stop laying eggs as well. I am only left with goats because they can stand the scorching heat.”*

Key informant: Agriculture Extension Officer: *“Most people in the area rear different types of livestock such as goats, guinea fowls, pigs and cattle. A lot of them used to rear a lot of chickens but they no longer because they die from New Castle disease and heat from the extreme temperatures. Most villagers report the disease when it is already late and when all their chickens and the chicks have been already affected. Cattle and pigs are also dying because of these extreme temperatures due to lack of grazing lands and enough water; the rivers are drying out and other water reservoirs.”*

From what the participants indicated it simply shows that climate change has negative effects on the household income activities. For example, most of the women were into poultry farming for household consumption and for income generation. Some were selling poultry at a scale that enabled them to afford to buy most of the necessities for household use. Due to the high temperatures which are causing chickens to die, it means there is a loss of income and nutritional value in their diet. In the picture in Figure 5.2 above, it shows a household only left with 3 chickens. Though the Agriculture Extension Officer indicated it is New Castle disease affecting the chickens, the vaccination is not making the situation better. This indication shows that the chemicals used to treat/vaccinate the chickens are not effective enough to combat this disease as it is caused by a virus, it leaves these subsistence farmers hopeless.

Besides rearing chickens as one of their sources of livelihoods, the participants also mentioned the issue of rearing pigs, goats and cattle as one of their livestock. The participants indicated that because of the little rainfall received, the grazing lands do not have valuable and adequate nutritious value for cattle, sheep and pigs in Mbire District focus group participant:

One of the individual participants indicated that:

Individual participant: *“Life has become very difficult for us because of the changes of the climate, the land is overgrazed and there is a scramble for resources among us as human*

*beings, domestic animals and wild life because we all have to share the resources we are left with.”*

Households rear a wide range of domestic animals for both household consumption and for sale. Although livestock production has been profitable in the past years, the environmental degradation of pastures and poor crop yields has affected productivity. The conflict with wild animals has also decreased the productivity of livestock production by many households.

#### **4.2.4 What type of crops/cash crops do you grow to generate income?**

According to Pereira (2017), climate change has negatively impacted temperature and precipitation, two very important variables for crop growth. Warming trends have already become evident across the continent, and it is likely that the continent's mean annual temperature will increase by more than 2°C by the end of this century. Added to these warming, changes in precipitation patterns are also of concern for agricultural systems on the continent. Furthermore, high temperatures and changes in rainfall patterns are likely to reduce cereal crop productivity across sub-Saharan Africa, ranging from a 2 percent decrease for sorghum to a 35 percent decrease for wheat. Maize-based systems in southern Africa are particularly vulnerable to climate change, with yield losses for South Africa and Zimbabwe predicted to be in excess of 30 percent.

Decreasing crop yields and increasing population is already adding pressure on an already fragile food production system due to chronic food insecurity. Munang and Andrews (2014:90), denotes that food insecurity will likely lead to social unrest, as has been the case in the past. For example, between 2007 and 2008, riots took place in several countries when prices of staples peaked. In 2010, hundreds of protesters took to the streets in Mozambique after wheat prices went up by 25% due to a global wheat shortage caused in part by wheat-crop-destroying wildfires from record high temperatures in Russia. The increase in bread prices led to arson, violence, looting and even deaths.

In Mbire District cotton is their main cash crop. However, due to climate change new seed cotton were introduced to increase production. The new seed was called BB and the women indicated that it has less seeds as a result their harvest has deteriorated and has affected their livelihood. Extremely high temperatures have affected their crop production. Other factors that have affected their crop yields include reduced rainfall levels, invasive species, and

human and wildlife conflict. The participants indicated that their cotton and maize yields and quality had deteriorated to such low levels that they were no longer able to sell to the Cotton Company and Maize Grain Marketing Board, respectively. Previously, as a cash crop cotton boosted their socio-economic livelihoods; they bought tractors, built houses and managed to send children to boarding schools. Due to climate change, their crop yields, especially cotton, sorghum, maize, and beans are no longer sustainable for most communities in the Mbire District. Vulnerable groups, including women have become susceptible to hunger; children have succumbed to malnutrition; and poverty has become prevalent in most the communities. The findings below clearly explain the effects of climate change on crop production and how it has worsened every year.

#### **a) Cotton**

*Participant: We grow cotton, beans, maize, groundnuts and sorghum. Cotton has been our main cash crop for years but in 1999 the Agriculture Extension Services changed the seed called G we were planting all the years and introduced BB. We would harvest maybe 5 x 90kg of cotton with the seed G. We would make a lot of money that we would not struggle to pay fees for our children, buying uniforms and other necessities.”*

*Participant: “Now with the BB new seed that was introduced, we have low yields, it is a miracle in most cases even to harvest 1 x 90kg bag of cotton. We asked the officials why they introduced the new seed and they indicated that the previous seed produced poor quality cotton. Now we are struggling financially because of the low yields.”*

*Participant: The previous cotton seed G was not easily affected by pests, diseases and insects especially American Ball Worm and Aphids, but this new one seed BB is easily affected and we end up using our savings to buy pesticides and insecticides and at the end of the day we are left with inadequate money to sustain the livelihoods of our families.*

*Participant: “The time when we were growing the G seed, I managed to buy tractor and cattle. Money was enough for most of the things we wanted. We managed to send our children to boarding schools. Now this BB seed they introduced according to the Agriculture Extension Officers, it has lots of seed, heavy seeds which produces good quality cotton. They indicated that, G was good but it had fewer seeds and produced poor quality material.*

*However, the BB seed is good for the Cotton Company of Zimbabwe but for us the farmers it is killing us compared to G. I used to sell 60 bales to the Cotton Company of Zimbabwe.”*

#### **b) Maize**

*Participant: “It is not only cotton that we used to grow, even maize used to produce good yields. Now because of the high temperatures and scarcity of rainfall, our harvests have deteriorated. One can harvest 2 x 50kg bags of maize in a 5-acre field. As result, there will not be any surplus to sell to the Grain Marketing Board. The little we harvest is for food consumption as subsistence farmers. We do not even know how we are going to look after our children because the climate is changing terribly.”*

*Participant: “We are suffering because even the maize we are harvesting is not good quality anymore because the rainfall season is now shorter as a result the maize does not reach maturity stage and the heat is making the situation worse.”*

*Participants: “The other problem we are facing in our maize fields are worms. They are attacking the maize before the maturity age and they wilt and die. Some people came up with different remedies but at the end of the day it is not helping because instead of dying they are multiplying. We have reported to the Agriculture Extension Officers but they have failed to control the worms and the chemicals they have provided are not working effectively. These worms are also affecting our fields and as a result we are not even able to sell because of the low production.”*

#### **c) Sorghum and Beans**

*Participant: “Mostly sorghum and beans are for household consumption. We do not normally sell them. However, the problem we are having with sorghum is of the *Quelea* birds. The *Quelea* birds have destroyed our fields at times we do not even harvest because they would have finished everything. Due to lack of rain and too much heat the grasslands are dry and there is inadequate grass for the *Quelea* birds to feed on hence they end up feeding on our sorghum and this results in insufficient food to last us until the next season. The other problem we are having with sorghum is insects, such as, *tsumwatsumwa* (grasshoppers) and *magomba* (worms). Elephants are also a problem; they are devouring our fields. Beans are one of our popular dishes we make for our families because it is nutritious. However,*

*magomba* (worms) are a problem and high temperature are affecting the growth, the maturity levels and when we harvest the quality is not up to the expected standard.”

#### **d) Groundnuts**

Participants: “*In the past when we used to receive enough rainfall and when temperatures were stable, we used to harvest lots of bags of groundnuts (Tumbe seed). Aphids are also affecting the growth of groundnuts. We would sell at Mbare Musika in Harare and Mukata House. Groundnuts generated a lot of income. Now the problem is the monkeys in our area they uproot and eat the seeds. They can uproot almost half of the fields; this results in insufficient income to buy even the basic commodities.*”

Crop production continues to be a major source of income by many households. However, rainfall patterns and conflict with wild animals has resulted in a decline in crop yields. The commercial crops, such as cotton, have also been affected by incidences of pests which often decimate the crop. Overall, climate change is have a negative impact on the crop yields as well as on household food security.

#### **4.2.5 Natural Resources and Wildlife Utilization**

According to Mwape (2003), environmental degradation is caused by the excessive use of the elements of nature through various human and industrial activities, hunting, cultivation, grazing and frequent application of chemicals in economic activities. Elements of nature that are utilised in development activities are air (oxygen, carbon dioxide, etc), water, plants, soil, wild animals, and marine and mineral resources.

In Mbire District, women have indicated the different uses of timber from the forest surrounding the communities. These include building kraals, fowl runs, houses, firewood and other household uses. Even though other people have resettled in Mbire District from other districts, they indicated there has not been a crisis as far as timber is concerned. *Mupani* tree (*colophospermum mopane*), *Munyii* (*Berchemia Discolor*) and *Mubvaropa* (*Pterocarpus Angolensis*) are hardwood timber and they build very strong and durable structures.

#### **a) Timber**

Participant: “*The timber we get from the surrounding forest is Mupani tree, Bird Plum (Munyii or (*Berchemia Discolor*) and Mubvumaropa (*Bird Plum* or *Pterocarpus Angolensis*).*”

*We use these for roofing of our houses, building fowl runs, kraal and firewood. There are still a lot of trees around which makes our lives easier as we do not run short of firewood and timber that we use for construction. We have been using them over the years. The change of climate has not yet affected the growth of the trees.”*

Participant: *“Even though people have been resettled in our area and cut down trees to build their houses and other structures, we still have enough that can sustain our livelihoods. With the floods we experienced, the timber we collect from the surrounding forest assisted us in repairing the damaged gardens, kraals, fowl run and we managed to rebuild houses and we had our normal lives back because we had shelter and our livestock as well.”*

Participant: *“The trees we use to construct our structures are very strong. We know if there are no floods, storms and violent winds we are in a safe environment. We treat the poles here and there so that they are not affected by termites.”*

#### **4.2.6 What type of Non-Timber Forest Products do you harvest?**

FAO (2014) defines Non-Timber Forest Products (NTFP) or Non-Wood Forest Products (NWFP) as being goods of biological origin other than wood derived from forests and other wooded land and trees outside forests. Different terms such as secondary, minor or NTFP are also being used by organisations, institutions and academics. Non-Timber Forest Products maybe gathered from indigenous forests, forest plantations, agro-forestry schemes and from tress outside forests. Examples of NTFP include products used as food and food additives (edible nuts, mushrooms, fruits, herbs, spices and condiments, aromatic plants, game), fibres (used in construction, furniture, clothing or utensils), resins, gums, and plant and animal products used for medical cosmetics or cultural purposes.

The NTFP are still available in the Mbire District. However, there are not as many as they used to be due to climate change. For example, the women indicated that they hardly see as much mushrooms in their fields, forests or even the ones that grows on trees as they used to. They indicated that mushrooms are more favourable in areas with good rainfall. The issue of herbs was highlighted by most of the participants and they all supported each other on how they are very helpful when it comes to their health, well-being and socio-economic livelihood.

Herbs from the trees such as *Murumanyama* (*Stuhlmannii*), *Mutamba* (*Guazuma Ulmifolia*) and *Zumbani* (*Lippia Javanica*) and other herbs have been of paramount importance to them. For example, *Murumanyama*, is an excellent herb and works to relief all the muscle pains. This herb is very important to them because they walk long distances to fetch water, firewood, long hours in the fields.

Focus Group Participant: *“The type of the non-timber products produced have not changed so much over the years. The only difference is that there are not as much as they used to be in the past. We have madora (Mpani worms), masenda (white Mpani worms), nhowa (Black Jack) and munyeve (African Spider Flower). During the drought and dry season, they help us a lot with our families as relish. Munyeve and Nhowa, traditional vegetables we dry a lot of them so that they can sustain us until the next season. Mpani worms we eat them during their season because we cannot dry them until the next season, they rot.”*

Focus Group Participant: *“When it used to rain a lot in the past, we used to get mushrooms but now we do not get them at all. Mushrooms, we used to dry them as well just like what we do with Munyeve and Nhowa traditional vegetables. These traditional vegetables are delicious and nutritious and you can cook them in peanut butter sauce if you do not have money to buy cooking oil.”*

Individual Participant: *“From our surrounding forests we also get trees which help us with herbs. Murumanyama roots and bark are very effective if one has joint problem, you boil either the roots or the bark and drink the water. The bark of Mutamba tree is good for treating fever and coughs. The Zumbani tree is good for menstrual pains, flu and cough. You make tea from the leaves and drink while it is still hot. There are many trees some of them I have even forgotten their names. When we do not have money to go to the hospital or clinic, we use those herbs they are very effective.”*

Participant: *“The readily available herbs are good to us because most the times we do not have money to buy medicine for us and our immediate and extended families. So, we use the herbs.”*

#### **4.2.7 Wildlife meat**

According to FAO (2014), wildlife makes an essential contribution to food security for many people worldwide. Food security is considered to exist where people have access to

sufficient, safe, and nutritious food which meets their dietary needs and food preferences for an active and healthy life. In many regions of the world, wild meat is consumed as the only available source of animal protein, either directly harvested from the wild, received as a gift within tight social exchange networks, or purchased. Additionally, in less developed regions, it plays an essential role in people's diets, especially where livestock husbandry and fishing are not feasible options or to complement livestock when unexpected production drops occur, such as during drought periods in savannah and desert areas.

The women clearly indicated that it is difficult for the men to hunt like they used to do in the past years because of the human and wildlife conflicts. Some take risks but it is dangerous because people are being killed by wildlife. Game meat had good nutritional value to their diet and added value to the women's socio-economic livelihoods in the semi-arid regions of Mbire District. Instead of relying mostly on their livestock they would substitute it with game meat. It was also an advantage to them as some would use the skin of the animals as mats in their households and some would sell the meat to get an extra income to sustain their livelihoods.

#### 4.2.7.1 What are your sources of game meat?

Participant: *"In the past men used to go hunt and bring kudu, impala, rabbit and other different kinds of meats. Now the problem is that of the resettlement and growing of the population, people have encroached in the habitat of the animals and animals have moved to the peripherals of the areas. So, it is dangerous to go and hunt deep inside the forest as one will be putting the life at risk due to human and wildlife conflict."*

Participant: *"The only time we eat game meat normally is during the Trophy Hunting season whereby we are given meat by the Safari Operators when the hunters have collected their Trophies."*

Participant: *"The other reason we do not go hunting anymore, is because of these dangerous wild animals roaming around, it is just a risk that one will be taking. You can simply be injured and killed. So, we mainly rely on our gardens, dried vegetables, livestock and food from the NGOs and government."*

#### 4.2.8 Human-wild life conflict

The increase in human population is mainly attributed to in-migration as households from overcrowded districts move into areas perceived to open opportunities for improved agricultural production. In the Mbire District, tsetse fly eradication made it possible to keep cattle in the district but the extreme temperatures are doing more harm than good as the cattle are dying due to climate change induced drought. Water is a limiting factor that influences settlement and agricultural productivity, which explains human settlement along the riparian zones of the major rivers. Animals such as hippopotamus, monkeys, elephants, wild pigs, have become a problem as they are now grazing in the gardens which are along the banks of the Manyame/Hunyani River. Hyenas and lions roam around even during the day and a few cases of school children being attacked on their way to and back from school have been reported. Also, ordinary villagers are attacked by these animals as shown in (Table 5.1) as they go about on their day-to-day business, or as they walk to their fields.

##### 4.2.8.1 Hippopotamus and humans

The participants indicated their concerns of climate change and the human-wild life conflict it has brought upon their lives and how it has affected their socio-economic livelihoods in their semi-arid region of the Mbire District especially these women. From the focus group one woman indicated that:

Focus Group Participant: *“The hippopotamus have ravaged our gardens along Hunyani/Manyamwe river because there is water, after grazing they then drink water. We dry our traditional fruits there, and traditional vegetables, they do not spare them either.”*

Supporting the above statement, one focus group participant also emphasized that:

Focus Group Participant: *“These hippopotamuses are also now grazing in our fields. At times when you wake up in the morning you will find out that half of the field will be grazed by these animals.”*

Community Development Coordinator: *“Early this year, there was a hippopotamus that ravaged most of the gardens along Manyame River, it ravaged other fields close by and we close such animals as problem animals.”*

Human and wildlife conflict is rampant in Mbire District as indicated by the participants above. Human population growth and demand for more land, water and other natural resources are intensifying conflicts between people and wildlife worldwide because people are moving in the wildlife habitat in search of land to build houses and land for agricultural purposes. According to Kanga, Ogutu, Piepho and Olf (2012), human–wildlife conflicts arise from direct and indirect negative interactions, leading to economic losses in agriculture through destruction of crops, human fatalities and injuries, depredation on livestock and retaliatory killings of wildlife. Most women who are more dependent on their gardens for socio-economic livelihoods are mostly affected because these gardens are a source of food and income through the sale of garden produce.

#### 4.2.8.2 Elephants, livestock and humans

The individual women, the focus groups and key informants all indicated that elephants were giving them problem in their fields where they grow maize, cotton, peanuts and sorghum for subsistence farming. They indicated that, elephants graze in their fields the same way hippopotamus does in their gardens. They cannot chase them away because of the fear of being killed by these gigantic animals.

Focus Group Participant: *“Elephants are just like hippopotamus; they graze in our fields. However, elephants graze way more than hippopotamus and they are very dangerous because they can kill as well. They graze during the night when we are sleeping and even during the day, we sometimes see them roaming around. Our lives are in danger.”*

Another group participant: *“These elephants have taken joy from us. We still do our day-to-day jobs; we still go to the fields; we always thank God when we come back alive because they are all over the place. In the past we would only hear about how dangerous elephants are but we never thought one day we will live with them.”*

Participant: *“In the past we used to light fire to chase away the elephants, now they are no longer scared. In Ward 15, the elephants killed a child when the mother and child were going to the fields. In ward 17 a man was also killed by an elephant some time ago. Elephants are problematic. They are too big and one cannot do anything. They eat maize, sorghum, groundnuts, in fact all the different types of crops and even in our garden they are intruding.”*

Community Development Coordinator: *“In the Mbire District, after the Land Reform programme, most farm labourers who were evicted from the surrounding farms settled in the habitat of these wild animals searching for agricultural land and to build their homes. Now there is conflict amongst human and wildlife for space and resources.”*

According to Kanga *et al.* (2012) mega herbivores (weighing over 1000 kg), such as the hippopotamus and elephant rank among the most problematic and lie at the heart of human–wildlife conflicts because they are dangerous to humans. Furthermore, despite the fact that mega herbivores often cause major devastation to crops and are often a physical threat to humans, most research has focused only on the elephant and neglected the hippopotamus, yet the latter are involved in numerous conflicts with people in many parts of Africa. According to Sithole (2019), a Mbire woman aged 52 under Chief Chitungo was trampled to death by an elephant using a footpath. In addition, these elephants have contributed to the decline in yields and farmers are no longer producing enough to sell anymore and are thus producing for household consumption. The encroaching by wildlife into homesteads and ravaging their crops has negatively affected the socio-economic livelihoods of community members, especially women due to climate change as they no longer afford to run the household in a more economical way to sustain their livelihoods. Paying fees, buying groceries, buying school uniforms and all the other household necessities is now problematic due to lack of at least stable income and food security.

#### 4.2.8.3 Lions, livestock and humans

The women also indicated that their livestock such as chicken, goats, cattle, guinea fowl and pigs were in danger as they were being attacked by wild pigs, jackals and hyenas, as well as lions during the night or when they are grazing along Manyame/Hunyani River during the day. The vulnerability of livestock to attack by wild animals is affecting the socio-economic livelihood of the women in Mbire District. This is demonstrated by the reluctance of villagers to barter grain for livestock as there are chances that the livestock can be attacked by wild animals. This is causing hunger and food insecurity in their households. Lions are also attacking people and the community is mainly concerned about the children when they are going or coming back from school. According to Sithole (2019), children in some villages can no longer go to school on some because of the threat of lions and elephants. Below are

the interviews carried out regarding human and wildlife conflict between elephants and humans:

Focus Group Participant: *“There are lions roaming around in our community, we are scared of our domestic animals when they drink water in the rivers or graze in the valley. Lions kill and eat them.”*

In support of the above participant, a focus group participant also said the following:

Focus group Participant: *“In December last year, I had 3 cattle; one was attacked by a lion and was dragged out of the kraal. I heard the sound from the kraal, I could not go because I did not know what kind of creature had attacked them. It was only in the morning we saw the lion paws, the damaged kraal and a blood trail into the bush nearby. Now I am left with 2 and I do not know for how long they will survive.”*

Individual participant: *“I look after my grandchildren, all my children died. My grandchildren go to the same school, still in primary. I fear for their lives when they are going to school. At times they do not go to school, especially if we hear reports about these lions. In the past, children would walk freely to school and we would not hear issues of children being attacked by lions. People who were mostly attacked and killed by lions were the ones who used to go hunting deep down in the forests.”*

#### 4.2.8.4 Monkeys, Livestock and Humans

Monkeys have become a problem in the villages surrounding Mushumbi Pools in the Mbire District. In the gardens, the monkeys can eat all the vegetables although they are more interested in tomatoes and king onions. They uproot the onions and eat the bulb together with the leaves. Normally, the monkeys do not come during the night to devour the gardens. Monkeys do not spare the maize, ground and round nuts and sorghum fields as well.

From the interviews with the various participants the following comments were made:

Individual Participant: *“I am one of the project members here at this centre. In our garden we have covo, rape, cabbage, tomatoes and king onions. The monkeys love stealing the tomatoes and uprooting the king onions.”*

Group Participant: *“Monkeys are clever and fast thieves. In our maize fields they enjoy eating the maize cob, the sorghum, roundnuts and groundnuts. They steal the cob from the maize plant. With the ground and rounds nuts, they uproot and eat. They can come as a troop and devour the field. In our gardens it is even worse as they eat everything, anything that has a green leaf.”*

Group Participant: *“We sometimes dry traditional fruits such as muuyu, matohwe and masawu in our yards to sell some and some for us to eat. If they (monkeys) get an opportunity they will just steal them and eat. We are even afraid to walk around eating because if they see you holding even a cooked maize cob, they can even grab it from you.”*

Community Development Coordinator: *“When we are going to work, we no longer leave our windows wide open like we used to do in the past. We make sure they are closed. If we leave them open by the time you come back all the food will be eaten and the place will be upside down. The main problem is that they (monkeys) move as a troop. There are rare cases whereby you only see one loitering around alone.”*

#### 4.2.6.5 Quelea birds, livestock and humans

The voracious Quelea birds fly in large numbers and they have been another problem to the Mbire District as sorghum is one of the main crops they ravage. Community members pointed out that these birds have devoured their fields season after season unabated. According to The New Humanitarian (2009), although the quelea birds prefer seeds of wild grasses to those of cultivated crops, their huge number make them a constant threat to fields of sorghum, wheat, barley, millet and rice. Furthermore, the average Quelea bird eats around 10 grams of grain per day roughly half its body weight, so a flock of two million can devour as much as 20 tons of grain in a single day.

All the participants indicated similar sentiments regarding this problematic bird. One participant from the focus group indicated that:

Focus Group Participant: *“We did not have with Quelea birds the past years, we only started having problems with them when ARDA introduced wheat in Mbire District. Maybe we had but I am sure there were not a lot. Since wheat is planted in winter and it is a dry season and they will not be enough grass for these birds and they can only feed on cereal crops. The*

*situation of the Quelea birds worsened and ARDA stopped planting wheat but already there were millions of Quelea birds. Now these Quelea birds are feeding on our sorghum at times we do not harvest anything at all not even a sack of sorghum. All our hard work just goes down the drain.”*

Focus Group Participant: *“The Quelea birds are mostly attracted by sorghum. They can devour the whole field because they fly in a huge flock. They feed on the sorghum anytime of the day and sometimes during the night. In the past we did not have Quelea birds in this area, not at all. We had different kinds of birds but they would not give us problems on our crops like what we are experiencing with Quelea birds.”*

The Agriculture Extension Officer reinforced what the two participants indicated and added that:

Agriculture Extension Officer: *“Wheat brought us a huge problem in Mbire District when we introduce it at ARDA, one of the ARDA farms. We stopped planting it because of the Quelea birds and because Mbire District temperatures were not cold enough to produce a high breed of wheat. However, the Quelea birds had already made their nests in the area when we decided to stop planting it and now it is a problem in the sorghum fields.”*

**Table 4.1: Human wildlife victims in Mbire District (March 2015 to February 2019)**

<b>Date</b>	<b>Type of payment</b>	<b>Ward</b>	<b>Species</b>	<b>\$ To be paid</b>	<b>\$ Paid</b>	<b>Balance</b>
28/01/15	Injury	3	Crocodile	150.00	0	150.00
18/02/115	Injury	12	Crocodile	293.00	293.00	0
26/02/15	Death	5	Crocodile	300.00	0	300.00
03/03/15	Death	3	Crocodile	300.00	300.00	0
14/03/15	Death	1	Snake	300.00	50.00	250.00
14/03/15	Injury	1	Snake	150.00	0	150.00
14/03/15	Death	9	Crocodile	300.00	50.00	250.00
15/3/15	injury	11	Crocodile	150.00	120.00	30.00
22/3/15	Injury	2	Snake	150.00	0	150.00
20/04/15	Death	1	Lion	300.00	100.00	200,00

17/05/15	Death	1	Elephant	300.00	100.00	200.00
01/10/15	Death	1	Buffalo	300.00	300.00	0
30/09/15	Death	1	Crocodile	300.00	300.00	0
12/10/15	Injury	10	Crocodile	150.00	0	150.00
07/12/15	Injury	16	Crocodile	150.00	0	150.00
23/01/16	Injury	17	Snake	150.00	15.00	135.00
23/03/16	Injury	10	Crocodile	150.00	0	150.00
23/02/16	Injury	9	Crocodile	67.00	0	67.00
25/03/16	Injury	10	crocodile	150.00	0	150.00
02/03/16	Injury	3	Hippo	300.00	250.00	50.00
07/04/16	Injury	8	Crocodile	20.00	0	20.00
12/04/16	Injury	14	Crocodile	150.00	0	150.00
10/04/16	Injury	9	crocodile	150.00	0	150.00
19/04/16	injury	9	Crocodile	1850.16	1850.16	0
08/06/16	Death	10	Elephant	300.00	200.00	100.00
14/05/16	Injury	1	Elephant	150.00	0	150.00
25/07/16	injury	4	Elephant	300.00	135.00	165.00
10/08/16	Death	12	Buffalo	300.00	150.00	150.00
21/10/16	Death	3	Bees	300.00	150.00	150.00
08/05/17	Injury	3	Hippo	150.00	0	150.00
26/02/17	Death	9	Crocodile	300.00	0	300.00
06/03/17	injury	7	Hippo	150.00	0	150.00
08/03/17	injury	7	Buffalo	150.00	0	150.00
18/07/17	injury	11	Buffalo	150.00	0	150.00
21/07/17	Death	17	Elephant	300.00	50.00	250.00
22/09/17	Injury	9	Crocodile	150.00	0	150.00
14?12/17	Injury		Elephant	150.00	0	150.00
31/12/17	Death	1	Lioness	300.00	150.00	150.00
04/01/18	injury	9	Crocodile	150.00	0	150.00
03/01/18	injury	3	Crocodile	150.00	0	150.00
13/04/18	injury	15	Elephant	220.00	0	220.00
13/04/18	death	15	Elephant	300.00	300.00	0

14/04/18	injury	17	Elephant	150.00	0	150.00
14/04/18	death	17	Elephant	300.00	300.00	0
04/05/18	injured	12	Hippo	275.20	0	275.20
22/05/18	injured	1	Hippo	150.00	0	150.00
18/06/18	injured	11	Buffalo	150.00	0	150.00
22/06/18	injured	16	Hippo	150.00	0	150.00
04/06/18	death	16	Snake	300.00	150.00	150.00
06/07/18	death	10	Hippo	300.00	300.00	0
09/08/18	death	2	Elephant	300.00	300.00	0
30/08/18	injured	2	Elephant	150.00	0	150.00
24/09/18	injured	9	Monkey	150.00	0	150.00
14/02/19	injured	12	Crocodile	69.00	0	69.00
29/04/19	Death	2	Elephant	300	300	0
<b>Total</b>				<b>12994.36</b>	<b>5913.16</b>	<b>7081.20</b>

**Figures in the table provided from the data base of the National Parks and Wildlife.**

### **4.3. What are the adaptations or coping mechanisms that can be implemented to mitigate the effects of climate change?**

#### **4.3.1 What are the adaptation/coping measures being implemented on live stock?**

The effects of climate change are felt by everyone all over the world especially in the rural areas where agriculture is a source of income and survival. Already all four dimensions of food security, such as, food availability, food accessibility, food utilization and food systems stability are negatively affected by climate change. Participants shared their experiences with the effects of climate change and how they have adapted and are applying coping mechanisms so that they can sustain their socio-economic livelihoods in the semi-arid region of the Mbire District. The participants mostly mentioned cattle, pigs, goats, sheep, chicken and guinea-fowls as their livestock. Most of the participants indicated that they have adapted to rearing of guinea-fowls and goats as they are more resistant to drought, harsh climatic conditions and extreme temperatures than other livestock (Figure 5.3 and Figure 5.4).



**Figure 4.3: Rearing guinea-fowl as an adaption to climate change**

Participant C: *“The past years my yard was full of chickens running around but because of too much heat they started dying. I do not have even one chicken left that I am rearing now, I have resorted to rearing guinea-fowl. Guinea fowls can survive these high temperatures and harsh climatic conditions. Around September and October, they do not die like the chickens.”*

Participant B: *“We have been struggling with the chickens the past few years but in the past, there was nothing like that. Chickens were mostly our source of income and for our household consumption. They would feed on the grass and weeds around the yard, then, the rain was consistent but now our yards are bare due to little or no rainfall. I have three chicken left. Just like most people around, I am thinking as well to try and rear guinea fowls because they can feed on anything and they are resistant to a lot of diseases.”*

Participant: *The Agriculture Extension Officers have tried to vaccinate the chickens but there have not be any improvement. I used to sell these chickens so that we can have money for basics and to have extra money, but now it’s difficult because I have nothing left and I am not like other women who are rearing guinea fowls.”*

Participant: *“I have stopped rearing chickens because they start dying in September when the temperatures rise. Now I only rear guinea fowls because they can withstand the heat and high temperatures. These vaccines from the Agriculture Extension Officers do not work, the more we use them, the more the chickens die. I used to sell eggs and chickens and use the money to buy necessities for the family. Not only did the chickens provide meat and eggs, I also used their residue as manure in my small garden along Hunyani/Manyame but now this heat is costing us.”*

Agriculture Extension Officer: *“The villagers report to us about the deaths of their chickens. According to them it’s the heat, yes, the heat is a contributing factor but the main problem is the New Castle disease. We informed them about it but they strongly believe that it is the heat only. If they could report earlier to us this issue, the chickens could be vaccinated and quarantined and that was going to minimise the risk of them dying from the heat and the New Castle disease. New Castle is a disease caused by a virus and it cannot be treated but we can control it. We instructed them to change regularly the grass from the fowl-run, water and keep their fowl runs well ventilated so that the chickens do not die. Some of them follow the instructions, some do not. The moment the chickens from one household are affected, the disease spreads fast to other surrounding households. However, we are still encouraging them to ventilate, change the grass in the fowl-run and water regularly just to minimise the deaths of the chicken so that some can survive during that September and October period.”*

Participant: *“It is not only the chickens which have been affected by the climate change, there are other livestock, such as cattle and pigs. Even our cattle are dying because there is not enough grazing land and water. As a result, we have resorted to rearing goats. Just like guinea fowls, goats are drought resistant. They are not affected very much like cattle when there is a shortage of water and grazing land and fodder. Most of us before the dusk we lock our livestock so that they cannot be attacked by wild animals while grazing outside. Most of us have also resorted to filling up dishes with water in our yards so that our cattle drink water from them saving them from being attacked by wild animals at the rivers.”*

Participant: *“Goat meat is a good source of nutrients. Since our cattle are dying now, goats are surviving in these changing times. The other advantage of rearing goats is that, they have two breeding seasons per year; they can breed two or three kids in each season so by the end of the year I can have six kids and in a short period of time I can have a lot of goats if they*

*are not attacked by hyenas or lions. The idea of using open containers for our livestock to drink water from has saved lots of them from being attacked by wildlife at the river.”*

*Participant: “The change of the climate has made us to concentrate more on goats because they are a good source of income. It is not too painful to sell a goat because you will know with the ones you have can breed and quickly replace the ones I would have sold. Selling goats assists in generating income for school fees, buying school uniforms and other household necessities. The other advantage is that with goats they are inexpensive and are quick to sell unlike cattle.”*

*Participant: “Most Fridays that is when the farmers from other surrounding towns come to Mushumbi Pools Growth Point and buy the goats and load them in their trucks. Some people sell their cattle as well since most of them are dying.”*

*Community Development coordinator: The business of selling cattle and goats has been rife lately. Instead of subsistence farmers watching their cattle producing poor quality milk, meat and eventually dying because of the droughts experienced in this area, they are now selling them. Some farmers from high rainfall areas purchase these cattle. With the income these women get to sustain their socio-economic livelihoods. Some buy goats, guinea-fowl, feeding pans for their livestock and other necessities with the money from their sales. As for the goats, some farmers buy them for cross breeding so that they can produce high quality meat and milk in their region which will benefit the country as a whole. By so doing, it boosts their finances and they are able to provide for their families.”*



**Figure 4.4: Goats being sold as a way of sustaining socio-economic livelihoods**

Table 4.2 below indicates the sales of livestock from Mbire District from 2014 to 2019. As presented in the table, goats have the highest sales figures for the period under consideration. The rearing and sale of goats was indicated to be a way of adapting to climate change as other sensitive livestock are affected by the heat induced by high temperatures, especially in the summer months.

**Table 4.2: Livestock sales from Mbire District (2014 to 2019)**

<b>Year</b>	<b>Cattle</b>	<b>Sheep</b>	<b>Goats</b>
2014	2960	758	9974
2015	4129	893	13 032
2016	4314	1140	16062
2017	3699	1234	14095
2018	2896	2741	18 864
2019	842	955	8488
<b>Total</b>	<b>18 840</b>	<b>7721</b>	<b>80 515</b>

**Figures in the table provided by the Agriculture Extension Officer from the data base.**

#### **4.3.2 Adaptation/coping measures on crop production and human and wildlife conflict on crops.**

Due to little and declining rainfall in Mbire District, it is now difficult for most people to have gardens in their yards. Most of them have resorted to having gardens along the Manyame/Hunyani River as a coping measure or adaptation mechanism to sustain their socio-economic livelihoods, especially women. It is much easier for them to water their gardens as they fetch water directly from the river. Figure 5.5 below shows a picture of gardens along the river bank of Hunyani/Manyame River. From the interviews carried out with the individual participants, focus group participants and key informants, the following responses were made:

Participant: *“In the past we had a cotton seed we used to call G or (Kamunzva Mari), it was rarely affected by diseases or insects. The government removed the seed in 1995 and introduced a new seed called B. Their reasons for introducing this seed were that it produces good quality wool from the few balls it produces. The government also indicated that, it is a good quality seed and produces good wool and nylon. To us as the farmers, this change disadvantaged us because this seed is affected by the American Ball Worm. As a result, we are not harvesting as much as before. One will be lucky if you harvest a 50kg bag of cotton. We harvested bags and bags of cotton in the past and some people built houses with the cotton money, and sent their children to boarding schools and university. Us as the community, we want the government to reintroduce the G seed back into the market so that we can have a good harvest and be able to look after our families again. This new seed attracts worms. The insecticides and pesticides provided by the government are not helping at all as the worm affects a lot of cotton fields in different villages.”*

Participant: *“Most of our boreholes and wells are drying out and we do not have enough water for our gardens in the yards. We have decided to grow our vegetable along the Hunyani River because it is easier for us to fetch water and irrigate our gardens. Even though during the floods they can be washed away but at least before the floods they assist us in getting fresh vegetables for household consumption.”*

Participant: *“Due to the droughts we are facing, growing our vegetables along Hunyani River has made a difference in our lives because at least we know we have a fall back. Some*

*people have big gardens that they even sell the vegetables to the other locals as a way of getting income to support their families.”*

*Participant: “Since the gardens along the rivers are the ones we are relying on, most of my fellow women have resorted to using thick bushy tree branches to barricade their gardens and prevent them from being easily destroyed by wild animals. Even though they are still destroying them at least these barricades can make a difference compared to other gardens that are not fenced or barricaded.”*

*Participant: “We have also resorted to the idea of building small temporary structures where someone can sleep over night and stay during the day to watch and guard the crops and dried tradition fruits mauyu (baobab fruit) and masawu (Indian plum) that we spread out on top of sacks to dry out; and chase away the animals that will come to feed on our crops. If there is no one guarding the crops, if the monkeys get an opportunity, they can finish all the dried fruits especially masawu in a short period of time because they love them too much. The garden area is the best area to dry our traditional fruits because it is more spacious and there is always someone guarding. We take turns with my children. Normally, they relieve me after school and they take over.”*

*Community Development Coordinator: “In our training centre we have a garden with different kinds of vegetables. The monkeys enjoy these fresh vegetables, especially king onions and tomatoes. So, we have employed a man who works in the garden to chase them away every time they want to come and steal. During the night there is a security guard who patrols around the centre. He also monitors the activities happening in the garden, in case the monkeys jump inside the garden.”*



**Figure 4.5: Gardens along Manyame/Hunyame River**



**Figure 4.6: Monkeys hanging outside the garden waiting for a chance to raid the vegetable garden and a man standing next to the borehole in the garden**



**Figure 4.7: Temporary structure next to garden to guard against intruding wildlife.**

#### **4.2.4 Adopting indigenous knowledge systems as an adaptation measure**

The participants brought up the issue of using their indigenous knowledge from the past, which could assist to address the challenges they are faced with as far as climate change is concerned. They indicated the involvement of spirit mediums and appeasing the ancestors so that they can go back to the traditional way of living which brought about positive results, such as good harvest and enough rainfall.

The responses from the interviews and discussions with participants are presented below.

*Participant: “When I got married here many years ago, rain was consistent. We had good harvests, our cows were fat, we had lots of water for animals to drink and for us. Hunyani River would flow throughout the year and there were sweet tomatoes and traditional vegetables which used to grow along Hunyani. Back then, if the rains delayed to come, the old men and women of the village would go to the spirit mediums (Mhondoro) and present their problem of the late rains. The spirit mediums from different villages would gather together to talk to the ancestors of the Mbire District and indicate to them that they should not turn their back on their children because soon hunger will strike them. After the spirit mediums had passed on the message to the ancestors, they would tell the old men and women*

*what the ancestors would have communicated to them and instruct them to do. An announcement would be made to the villages that the young girls and boys should join the others at the Spirit Medium homestead. The traditional beer would be brewed and we would sing traditional songs asking our gods/ancestors to remember us as we would die of hunger. Traditional beer that was brewed as part of the ceremony to ask for rain was called Doro rekukumbira mvura. We would stay there maybe for about three days drinking the traditional beer until it is finished. When we are done, the spirit mediums would talk to the ancestors again and then after that everyone would go back to their houses. On our way home it would start raining. We would start singing again and rejoice as we walk back home in the rain.*

*The reason why I am mentioning this is because I think if we go back to our traditional ways of living, allowing the ancestors and spirit mediums (mhondoro) to intercede on our behalf, we will overcome some of the challenges we are facing and everything will be back to normal.”*

*Participant: “Supporting what she just said, even if the rains prolonged beyond the normal season and we start fearing that the crops will rot in the fields before we harvest, the same thing she mentioned above would be done. When we go back to our homes after a few days, the rain would stop and allow our crops to dry then we would harvest and store them for the next season.”*

*Participant: “Getting guidance from the ancestors is good because the time we followed their footsteps everything worked out well. In some seasons, in the months of August we would experience heavy winds, these winds would scatter the saturated clouds which would bring the rains. We would go the spiritual mediums again and the same process mentioned with that lady would be done. We would brew the traditional beer called Doro Rehuruva, which was meant to calm down the heavy winds. After the celebrations again after a few days the wind calms down and the rains too.”*

*Participant: “There was a time when we had a problem of worms in our maize fields, a long time ago. We went to the spirit mediums to report the problem we were faced with. Just three villages were asked to bring one worm from their field. We did that, the spirit medium indicated that we do not have to go in our fields for the next three days. We waited, the fourth*

*day and when we went into our fields, we did not see even one worm. Now we are struggling with the worms and aphids. The chemicals we are using are not effective. Our ancestors knew we lived on the land and they provided for us and had ways of making our lives better. Now the problem is that everyone is a Christian and they have abandoned our tradition or culture. Even the spirit mediums (mhondoro) we see them drinking at the Mushumbi Pools growth point. Some will be wearing jeans, smoking cigarettes, playing around with women. In the past you would not see a spirit medium (mhondoro) wearing casual clothes, they dressed in their traditional attire always. They would walk from point A to point B. They did not use private or public transport. Now we get into the same bus with them, our tradition has been washed away and I am sure that is what is causing all these problems we are facing.”*

#### 4.2.4.1 Traditional adapting/coping measure of storing food

*Participant: “Drying our vegetables has been the best way of preserving them because we will store enough to last us until the next season. Now that we know the rain is not reliable and no longer consistent and the heat is too much, we make sure we have enough dried vegetables from our gardens and the traditional vegetables which grow in our maize and sorghum fields during the rainy season. In the past we never used to preserve a lot because we would have fresh vegetables from our gardens in our yards, but now because of the drought and extreme temperatures we make sure we are on the safe side.”*

*Participant: “We also dry masawu one of the common wild or traditional fruit in this region. We dry them in our gardens which are along the rivers because there is enough space to spread them out. We also have mauyu, the baobab fruit tree. Both fruits have nutritional benefits which assist us in healthy living.”*

*Participant: “Sometimes we also preserve dried beef and goat meat, especially goat meat because they breed two times a year, that means there will be availability of meat through the year if one chooses to slaughter regularly.”*

#### **4.2.5 What are the likely interventions by foreign and local aid to address the effects of climate change on the socio-economic livelihoods of rural women in semi-arid region of Mbire District?**

There are mitigation measures which have been put in place to assist the rural women in the semi-arid region of Mbire District to better their lives due the negative effects of climate

change. The government, NGOs and the Mbire Rural District Council have been actively involved in trying to assist communities to alleviate hunger and reduce poverty.

#### 4.2.5.1 Government interventions

The Ministry of Lands, Agriculture and Rural Resettlement (MLARR) has been supporting a project funded by the Zimbabwe Resilience Building Foundation at Mushumbi Crop and Livestock Innovation Centre. The project is mainly done by women as a source of income. Mushumbi Crop and Livestock Innovation Centre is mainly involved in vegetable production. These include spinach, covo, rape, onions, tomatoes and carrots. Women from the villages around Mushumbi Pools are engaged in running the project. They water and weed the gardens. According to the Project Manager, the women take turns to water, weed and to look out for the invading of monkeys. There is always someone in the garden to look out for the monkeys. The Ministry has also provided the land where this project is being implemented.

The MLARR also assists in providing 50kg of maize to the most vulnerable people as part of the Drought Relief Programme. The vulnerable populations include the elderly, especially women and orphans. However, they try by all means to make sure that all members of the communities receive assistance. The maize distribution under the Drought Relief Programme is conducted by the Department of Social Welfare as they are familiar with vulnerable elderly women and vulnerable families in the communities of the Mbire District. The maize is provided by the Grain Marketing Board (GMB) of Zimbabwe.

The Grain Marketing Board of Zimbabwe also provides families, especially the vulnerable elderly women in the villages surrounding Mushumbi Pools with inputs, such as, maize and cotton seed, for their farming activities. The arrangement made between the GMB and the community members is that, when they have harvested, they will sell their cotton to the Cotton Company of Zimbabwe only. As for the maize seed the villagers are required to pay it back.

According to the Agriculture Extension Officer, they assist the community members with educational information on crop and animal production, such as how family holdings or farmers can improve the methods and techniques of agricultural production and farm management in order to increase productivity, crop quality and income. This is intended to

improve the standard of living of the villagers by elevating their socio-economic livelihoods; and to combat food insecurity in their households.

The Ministry of Information, Postal and Telecommunication Regulatory Authority of Zimbabwe are in the process of establishing Information Centres at Growth Points, such as Mushumbi Pools Growth Point and other surrounding growth point. These information centres will allow the community members to have access to the internet for free and to enable the community members to have access information on the state of the weather other important issues. In addition, a public television has been erected at Mushumbi Pools Growth Point with the intention to use it as a mode of communication when there are any threats in the environment, such as stray endangered animals, heat waves, floods, violent winds and storms and any special announcements to alert the community members regarding their well-being and their livelihoods.

The Community Project Coordinator from the Mbire Rural District Council indicated that, the Civil Protection Committee which consist of the existing government, private and NGOs work together in implementing regular activities, which contain elements of prevention and community development. These organizations have a level of flexibility structurally, materially and technically which enables them to speedily adjust from their regular activities to undertaking protective, relief and rehabilitation measures in times of disasters in terms of intensity only without drifting from their operational principles. According to Zimbabwe National Contingency Plan, Civil Protection Committees (2012-2013) notes that, the Government of Zimbabwe through the Department of Civil Protection (DCP) has the responsibility to coordinate the management of disasters as well as all relevant stakeholders. The execution of this co-ordination mandate is realized through the National Civil Protection Coordination Committee (NCPCC) which informs the overall framework for the promotion, coordination and execution of emergency and disaster management in Zimbabwe.

Furthermore, permanent members of the NCPCC are officers selected from government Ministries/Departments, Parastatals and NGOs. Other members especially from the private sector are co-opted as dictated by circumstances. Provincial and District Administrators (PAs/DAs) are also mandated to coordinate any emergency-related activities in their respective provinces and districts through the Provincial or District Civil Protection Committees (PCPC/DCPC) and with the assistance of NGOs partners in the districts. This

multi-sectorial representation ensures the liaison between local and national authorities, NGOs and the United Nations.

The Community Development Coordinator from the Mbire Rural District Council reported that, as Civil Protection Committee comprising of the council, Action Aid International Zimbabwe and World Vision implemented the WASH programme to ensure access to clean water and a cleaner environment. The project was implemented in 2015 after the floods which occurred and they feared the outbreak of waterborne diseases. It was mainly implemented to increase access to the availability, sustainability, safe water and environmental sanitation for poor and vulnerable villages in Mbire District. The reduction of WASH related diseases, including diarrhoea, cholera and trachoma was made possible through the encouragement of personal hygiene and clean environmental practices. According to the WHO (2018), access to sanitation facilities is a basic human right that safeguards health and human dignity. Every individual deserves to be protected from disease and other health hazards posed by the poor disposal of excreta and human waste. Furthermore, children who are the first and the most vulnerable to fall prey to such hazards, deserve a better environment and the highest standard of living possible, according to the Convention on the Rights of the Child, a treaty which has been ratified by nearly every country in the world.

The community members were encouraged to construct and use Blair toilets and desist from practising the bush system. They were also encouraged to avoid cooking or drinking water straight from the Manyami/Hunyani River before first boiling it. By so doing it benefited the socio-economic livelihoods of the community members especially elderly women in the sense that, the burden of looking after the sick was reduced because of access to clean water and environment. There was an improvement in the health status of villagers due to prevention and reduction of diseases, such as diarrhoea. This limited the frequency of clinic and hospital visits by villagers, thereby saving them the drudgery of walking long distances to seek medical help. As a result, women had more time available to engage in income generating activities, such as gardening, harvesting and drying of traditional plums (masawu) and baobab fruit (mauyu) for income generation.

#### 4.2.5.2 Initiatives by Non-Governmental Organisations

There are a number of NGOs offering assistance to communities in the Mbire District. These are Adventist Relief Agency (ADRA), World Food Programme (WFP), Zambezi Valley Alliance and World Vision. The NGOs all work hand in hand with the Mbire Rural District Council in implementing community programmes.

The Adventist Development Relief Agency is an independent humanitarian agency established in 1984 by the Seventh-day Adventist Church for the specific purposes of individual and community development and disaster relief. According to ADRA (2016), the organisation responded to a recent serious drought that affected countries across the Southern Africa, where El Nino conditions caused the lowest ever recorded rainfall between October and December 2015. The El Nino effect also spread to countries in the Horn of African Region. Furthermore, in partnership with its network partners and local church, ADRA has also responded to the plight of communities in Mbire District, in Angwa, Kanyemba and Masoka. The response focused on food relief providing food ration packs containing, 50 kg of maize meal, 3,750 ml cooking oil, 10 kg dried sugar beans and 1 kg iodized salt to 140 affected households in the area in the vaDoma people who are marginalised because they are still involved in hunting and gathering, the vulnerable women and old women.

According to ADRA Zimbabwe (2019), it implemented a Community Management Disaster Risk Reduction (CMDRR) project in Mbire District (October –December 2017). One of the main aims of the project was to encourage the building of strong housing for livestock prevention from being attacked by hyenas, lions and jackals. Chillies and chillies bombs were also used to prevent elephants from attacking the community members and destroying their crops.

The WFP assisted in providing food aid through its implementing partners. The implementing partner used by the WFP was the Lower Guruve District Association (LGDA). It assisted in distributing food hampers with beans, cooking oil and flour. The LGDA has the database of the most vulnerable people. Women and orphans are on the priority list especially this period because of aftermath of the drought of 2015.

World Vision implemented the WASH programme as a way of improving the socio-economic livelihoods of community members especially women by making sure that they

have access to sanitation facilities and safe and clean water without having to walk long distances and increasing their vulnerability to rape and other forms of abuse. This WASH program supports the SDG 6, which is clean water and sanitation. The World Vision encouraged and empowered the community members to build wells for clean water and work as a community to construct small dams for watering livestock and gardening projects instead of gardening along Manyamwe River where they will become prey to crocodiles, lions, hyenas and other wild animals. It also assisted in community building and building relations since they all worked together in trying to achieve the same goal. This WASH project also promoted the building of Blair toilets for the community members so that they can avoid using the bush system because it made everyone vulnerable to any form of attacks from wild life especially as they would use the bush during the night for privacy. The project assisted most of the community members especially women because the small dams made it easier for them to be able to water their gardens; wells provided them with clean water for cooking and drinking. Having gardens close by assisted villagers to have access to fresh food for the family and also sell surplus vegetables to sustain their livelihoods.

Mushumbi Crop and Livestock Innovation Centre is a project funded by the Zimbabwean Resilience Building Fund (ZRBF). The ZRBF is supported by the MLARR, the European Union (EU), the Embassy of Sweden and the United Nations Development Programme (UNDP). This project involves the community members from the villages surrounding Mushumbi Pools in the Mbire District. However, most of the people involved are women because they are the ones who work to enhance the well-being and livelihood of the families. This project involves gardening, seed banking, maize storage, cattle and goat pen fattening. Pictures of the projects are presented in Figures 5.8 to 5.10 below.



**Figure 4.8: A cooperative project for women as an adaptation measure to sustain their socio-economic livelihoods**



**Figure 4.9: Garden at the Mushumbi Livestock and Crop Innovation Centre for women empowerment and climate change adaptation**

The vegetable garden assists the group of men and women to sustain the socio-economic livelihoods of their families due to the effects of climate change in the semi-arid region of Mbire District. Some of these vegetables they grow are for the consumption by their families, while the surplus is sold to other community members. They also supply vegetables, such as covo, onions and tomatoes to different organisations within and around Mbire District when they are hosting workshops. These opportunities assist them economically from the income they generate from the vegetable sales they make.

The other advantage of this project is that the vegetables they grow are organic and add variety and nutrition to their diet. There are no artificial fertilisers in growing the vegetables. Only cow and goat dung are used as manure for the gardens. Organic food is nutritious; it improves and promotes a healthy lifestyle to families in different villages of Mbire District. For school going children, their grades might improve, their performance become excellent as a result of improved health. The workload of women is also reduced when the family is healthy as women no longer have to spend time taking care of undernourished and sick children or other family members. However, with a good supply of these vegetables there is alleviation of poverty, the cycle of poverty is broken and food security is promoted.

There is a borehole which they use to water their garden and livestock. There is also a grinding mill as well, which generates income from the villagers who grind their maize or sorghum at the mill.



**Figure 4.10: Pen-Fattening for the cross breeding of indigenous and exotic Boer goats**

Goats and cattle play an important socio-economic role in many rural parts of the world in contributing to food and nutrition security. They are a source of food as well as income from sale of the animals and their products, including skins, meat and milk, and manure. Figure 4.10 above shows the goats and cattle in being reared for pen fattening. The goats comprise of exotic breed from Botswana being cross bred with indigenous goats. The project manager indicated that through cross breeding, high quality meat and milk are produced. Also, a new breed of goat with highly nutritious meat and milk products is produced which has a good value for money when these project members sell them as a source of income.



**Figure 4.11: A chemical treatment room and Seed Bank at the Mushumbi Livestock and Crop Innovation Centre**

Most of the women in the cooperative are subsistence farmers and they cannot afford to buy pesticides and insecticides to protect their seeds from being attacked or destroyed by pests and insects. So, the Mbire Crop and Livestock Centre has a Seed Bank as shown in (Figure 4.11) where villagers keep their seeds for the next planting season. Each of the women have their crop seeds stored here. The seeds include sorghum, mustard, pumpkin and bean seed. It is safe to keep the seeds in there because the room is treated with chemicals which destroy any pests and also the seeds are treated. This is a free service provided by the MCLC as it

benefits these women and other farmers to produce good harvest and high quality crops. Most of these villagers keep their seeds here in case of floods and storms because their storage houses (matura) are not as strongly built like these seed backs. So, they fear that should any of these disasters takes place they will be washed away and they will be left without seeds for the next ploughing season.

Campaign for Female Education (CAMFED), has assisted in some villages in Mbire District by paying school fees for vulnerable girls whose disadvantaged families cannot afford. CAMFED is an international non-governmental, non-profit organization whose mission is to eradicate poverty in Africa through the education of girls and the empowerment of young women. It assists girls from primary school until they complete university; girls who are willing to study and empower themselves academically. It also assisted by giving out bicycles to girls who were walking long distances to school to make their lives easier and provided them with school shoes, jerseys and uniforms. By so doing this makes life easier for women as they do not have to worry about school fees since the burden will be lifted off their shoulders.

#### 4.2.5.3 Mbire Rural District Council

The Mbire District Council provides land for developmental initiatives and guidance, The Mbire Crop and Livestock Innovation Centre is one of the projects they assisted with land for the implementation of the activities being carried out. Now, the community members are utilising the land as their main source of income for their livelihoods of their households as they are engaging in the agricultural activities.

Recently, the Council in conjunction with the Ministry of Information, Postal and Telecommunication Regulatory Authority of Zimbabwe has erected an information public television as shown in (Figure 5.12) which will assist the whole community in notifying them about disasters, such as floods, violent winds, storms and other tragedies that can affect the communities directly. This public television was erected at Mushumbi Growth Point, which is a small business area where people buy their basic commodities on a daily basis. However, the project has not been finalised yet. Plans of setting up an internet café are underway to provide access to the internet to the villagers. This internet café is meant for the community members to be able to access and read news and keep abreast with activities and news

happening around the world regarding climate change, which will benefit them directly and indirectly.



**Figure 4.12: A public television under construction intended to warn the community members about natural disasters such as violent winds, storms, floods and other information of paramount importance.**

The Mbire District Council is in the process of building a warehouse storage as a contingent plan in case of disasters, such as floods and storms as shown in Figure 4.13. Materials such as tents, empty bucket which will be used for water storage, blankets and mattresses and other necessities will be kept in the warehouse and will be distributed to the affected community members, especially women, children and the vulnerable. The warehouse is being constructed in the Mbire District Council premises for security purposes since the premises are fenced and security service is provided for 24 hours. Figure 4.13 below shows the picture of the warehouse building under construction.



**Figure 4.13: A storage warehouse in the Mbire District Council premises under construction intended to store blankets, tents and other necessities as a contingent plan in case of natural disasters such as storms, floods and violent winds.**

The Mbire District Council also provides services such as Problem Animal Control (PAC) in the Mbire District, especially in villages such as Angwa, Gonono, Masoka and Kanyemba where the incidents of human and wildlife conflict are rampant causing deaths and destruction to crops and homesteads. In Masoka, there were hippopotamus grazing in the gardens along Manyami River. There was one amongst the hippopotamus which was very problematic and was shot by the Safari operators and the meat was distributed to the community members as a way of mitigating hunger and alleviating poverty. Mbire District works in conjunction with the Zimbabwe Wildlife National Parks. From March to October, it is the Trophy Hunting Season of animals, such as elephants, leopards, kudu, impala and buffalos. The contract signed between the Safari Operators and Mbire District Rural Council indicated that a certain percentage of meat should be distributed to the community members after they have collected their Hunting Trophies. The fees paid for hunting and levy are used by the Mbire District Council to develop the community and funeral assistance in case of casualties, food and transportation during the funeral.

## CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Introduction

This chapter presents a summary of the entire study. Therefore, the aim and objectives of the study and the methodology adopted to gather data are restated. This includes the highlighting the research questions and objectives used to guide the study and the research techniques utilised to gather the data as well as the conclusions reached and recommendations suggested.

The study adopted an exploratory and case study design to explore and gain in depth understanding of the effects of climate change on the socio-economic livelihoods of rural women in the semi-arid region of the Mbire District. The study was guided by the three research questions as follows: (i) What are the effects of climate change on the socio-economic livelihoods of rural women in the semi-arid of Mbire District, (ii) What the adaptations or coping mechanisms can be implemented to mitigate the effects of climate change and (iii) What are the likely interventions by foreign and local aid to address the effects of climate change on the socio-economic livelihoods of rural women in the semi-arid region of Mbire District.

The objectives of the study are closely related to the research questions mentioned above. The objectives were stated as follows: To closely related understand the effects of climate change on the socio-economic livelihoods of rural women in the semi-arid region of Mbire District; To evaluate the adaptation or coping mechanisms of rural women including the use of IKS applied to mitigate the effects of climate change, and; To establish potential areas of the interventional by foreign and local aid to address the effects of climate change on the socio-economic livelihoods of rural women in the semi-arid region of Mbire District.

The participants of the research study, included individual participants, focus group participants and key informants and they all indicated that the effects of climate change had negatively affected their socio-economic livelihoods because they depend more of agriculture in the semi-arid region of the Mbire District. The individual participants comprised of three elderly women aged seventy years and above; and the focus groups comprised of seven participants aged between fifty-five and sixty-five years. The key informants comprised of participants from the Mbire District Council, Agriculture Extension Services and the

Zimbabwe National Parks and Wildlife. The Headman and the Councillor were the gate keepers who gave the researcher the opportunity to carry out the study.

The data collecting methods included personal interviews, focus group discussions, and collation of data from the secondary sources and key informants. The data collected was analysed using the thematic content analysis. Secondary data gathered from the government institutions played a pivotal role by assisting with background information for the study regarding the effects of climate change.

## **5.2 Conclusion on the research findings**

This section of the chapter presents the conclusions made with regards to the study findings based on the objectives that the study sought to achieve. The relevant aspect and most crucial role played by the literature review was in contextualising these conclusions.

### **a) Conclusions on the findings regarding the first objective, which is, the understanding of the effects of climate change on the socio-economic livelihoods of rural women in the semi-arid region of Mbire District.**

The objective of understanding the effects of climate change on the socio-economic livelihoods of rural women in the semi-arid region of Mbire District was explored with the individual women aged seventy years and above, focus group discussion with women aged between fifty-five and sixty-five years, the key informants and the secondary sources from the Mbire District Council, Zimbabwe National Parks and Agriculture Extension Services. The women indicated that climate change had affected their socio-economic livelihoods in the sense that their yields have deteriorated due to unreliable rainfall. The rainfall season is increasingly getting shorter with the onset of rains starting only in December and ending in March. The rains are usually too little for their crops to reach maturity level and the extreme heat also causes crops to wilt and die. The yields from the major crops such as maize, cotton, sorghum, peanuts and beans have been declining. For example, the women indicated that they bought tractors and built houses with the income they generated from cotton and maize in previous years but now they hardly harvest enough produce from the same fields where they used to have bumper harvests. Most of these women were into poultry production but now they no longer rearing chickens because around September/October the chickens die due to exhaustion from extreme heat. This has affected their socio-economic livelihoods as they

depended on the poultry for household consumption and income generation. Most of the women were rearing poultry on a large scale and the income they accumulated assisted with basic commodities they need for their household and other necessities.

Human and wildlife conflict has taken a toll on the communities, as their gardens along Hunyani/Manyame are being devoured by wild animals, such as elephants, hippopotamus by day and by night. Gardens were their source of vegetables as they planted different vegetables from covo, carrots, rape, tomatoes and king onions. King onions and carrots are mostly favoured and devoured by monkeys. These small gardens brought about good nutritional value in their lives and was also a source of income. Their maize, sorghum and groundnuts fields are also raided by elephants, monkeys and hippopotamus. The small fishery businesses that previously depended on the Manyame/Hunyani River have collapsed because most people are attacked by crocodiles resulting in fatalities. This reduction in the fish business has also affected their diet because fish was a good source of protein for them and their households and also sources of income to sustain their livelihoods. Quelea birds move in flocks and devour their sorghum crop resulting in major decline in yields to below subsistence levels.

Invasive species have become a nuisance due to floods and violent storms. During floods and stormy weathers, these species are washed away from different areas and are dumped in the crop fields. The participants indicated that this have resulted new breeds of worms and weeds in their fields. The main weed they all indicated was a rare Blackjack, which is a troublesome weed as it grows at the same pace with crops. They also indicated of *magama* (worms) attack and destroy their crops, especially maize. There are also rare aphids which are white in colour that have now emerged and causing problems in the fields. Violent storms damage crops and physical infrastructure, which makes life more difficult as road are destroyed making it difficult to travel, and produce sufficient food to last them to the next season.

Some boreholes and wells from the Mbire District have dried up due to low precipitation. The water from other boreholes have become salty making it less palatable and thus utilising it for watering domestic animals. This situation is forcing women in their old age to walk longer distances to go and fetch water, especially those left with grandchildren to look after as their parents died due to HIV/AIDS or migrated to look for greener pastures due to climate change. Some even walk for two to three kilometres carrying large and heavy containers.

In conclusion based on the findings, these women are bearing the brunt of climate change as the backbones of most families and as they continue to depend on rain-fed agriculture. The effects of climate change have a negative impact on their socio-economic livelihoods because of the change of lifestyle, rainfall patterns, human and wildlife conflicts and extreme temperatures. As a result, food insecurity, hunger and poverty become more prevalent.

**b) Conclusions on the findings of the second objective, which is, the evaluation of the adaptation or coping mechanisms of rural women including the use of Indigenous Knowledge Systems applied to mitigation the effects of climate change.**

This objective of the evaluation of the adaptation or coping mechanisms of rural women including the use of Indigenous Knowledge Systems applied to mitigate the effects of climate change was explored and the study confirmed that, the rural women of the semi-arid region of the Mbire District have come up with different strategies to combat these effects.

The participants which are the individual participants and focus groups indicated that, regarding their gardens, they make sure they take turns to guard against their gardens. They have built temporary structures as mitigation measure in the garden areas where by a person can play music on loud volume to scare away loitering animals so that they do no raid their gardens. Sometimes they apply the use of their Traditional knowledge Systems by lighting fire in outside their homesteads or to play traditional drums to scare away the wild animals.

The person in charge spends the whole day and the other one goes at night. Normally women are the ones who guard them during the day and men during the night. It is a risky activity but that is the only way they can safely guard their gardens because they their sources of organic food and income as they sell some to sustain their socio-economic livelihoods. Due to the water scarcity most of them no longer have gardens in their yards Munyame/Hunyani River is saving their lives because they fetch the water directly from the river and water their plans. They have also built barricades around their gardens to protect them from stray wildlife which can devour in their gardens. This system of having someone guarding is being implemented in their fields as well to guard again their crops such as maize, sorghum, groundnuts and beans. Sorghum is mostly attacked by the quelea birds and they can feed on a field in one day.

The other mitigation measure they have applied is the use of buckets or containers to water their animals. Instead of their animals drinking from the Munyame/Hunyani River, some of the women have resorted to filling up containers so that their animals will drink water in the yards as they monitor them so that they are not attacked by wildlife such as lions, hyenas and crocodiles along the river because they have become a prey to these animals. This is a way of protecting them from being killed and it is a huge loss for them because livestock is a sign of wealthy in most rural households.

The planting of mostly sorghum instead of maize like they used to do in the past is also another mitigation measure they have taken into consideration to sustain their socio-economic livelihoods. Sorghum is drought resistant crop and it can survive in the extreme heat unlike maize and other plants. Sorghum has been their main source of carbohydrates to mitigate the harsh climate change. Without the attack by quelea birds it can thrive in the extreme temperature and they can have a good harvest. It might not be sufficient to sustain them to the next planting season but it assists in the eradication of hunger and malnutrition in children and enhances food security. There is also a traditional fruit called Mauyu (Baobab fruit). In Harare some individuals are making juice out of the fruit and sell it. So, these village women collect a lot of them from their forest and supply them to individuals in Harare would be in the juice making business, the income generated from supply boost them economically and they are able to run their households with the little they get financially.

The women have come up with mitigation measures to combat their deaths of livestock due to the effects of climate change. As an adaptive or copying mechanism measure most of the rural women have resorted to rearing guinea-fowls instead of poultry because, their poultry is dying because of the extreme heat. Guinea-fowls are resistant to extreme temperatures and drought. They can survive the harsh conditions of climate change unlike poultry. The women indicated that the price of guinea-fowl whether to sell or buy are much higher than the poultry. So, if one is in a business of selling guinea-fowl, you are guaranteed that you can generate income. Guinea-fowls have much higher nutritional value than chicken which is good as there are changes to combat hunger, diseases and malnutrition in families. Another adaptation measure of the effects of climate change is rearing of goats more than other livestock like cattle. Goats like guinea-fowls are drought resistant. Even though there is shortage of water and with nothing much left in the grazing lands they survive. Cattle cannot

survive under such conditions and worsened by the heat; they die. So, the business of goats has been viable and it is blooming and flourishing in Mbire District. Women are selling these goats and send their children to school, buy uniforms and other basic commodities

The use of their Indigenous Knowledge System is one of their main mitigation measures. Due to the droughts, they have resorted to drying vegetables from their gardens and traditional vegetables which grow in their fields during the rainy season. They dry a lot of them in their garden so that they can sustain them for quite some time. These ways of preserving food have been implemented centuries ago and now they have resorted to it again as a means of survival due to the effects of climate change. It is not only vegetables they preserve, even game meat and beef. Preserving of traditional fruits such as masawu is also one of the adapting or copying measure they have implemented as they have a nutritional value to their diet and able to combat the effects of climate change. The use of medicinal herbs has saved most families because of their economic hardships. Most women are not financially stable or independent to take their children or family members to clinics or hospitals for medical assistance and herbs replace the tables which they were supposed to purchase from the pharmacies. Women carry the burden of looking after the sick and cooking for them in most households.

Regarding the Indigenous Knowledge Systems, the participants both individuals and focus groups indicated if only our African culture had not been eroded by Christianity, they would be assisted by Spirit Mediums (Mhondoro) to appease the ancestors (Vadzimu) and brew the traditional beer and ask for rain from Musikavanhu (God) that asking for the rain through brewing of traditional beer (Doro) called Doro Rekukumbira Mvura. The indicated that all the problems they are having with invasive species should have been resolved because in the past you would address the problems to the Spirit Mediums for example about Magomba (worms) in the fields. The Spirit Mediums (Mhondoro) would give an instruction of not going to the fields for a week or so. After the instructed time, when you go into the fields, one would not even see any of the worms.

**c) Conclusions on the findings of the third and last objective, which is: To establish potential areas of the intervention by foreign and local aid to address the effects of climate change on the socio-economic livelihoods of rural women in the semi-arid region of Mbire District.**

This objective of establishing potential areas of intervention by foreign and local aid to address the effects of climate change on the socio-economic livelihoods of rural women in the semi-arid region of the Mbire District has been fully explored and addressed. The study confirmed that the rural women of the semi-arid region of the Mbire have been assisted by international NGOs, Government and the Mbire District Council as a way of mitigating the effects of climate change.

NGOs such as CAMFED have assisted most girls in the Mbire District by awarding them scholarships from primary school level to university. CAMFED mainly focuses on empowering the girl child academically in line with the SDG 4 which emphasises quality education for both boys and girls. CAMFED has mostly focused on female headed households and other households to relieve them of the challenges and costs associated with the cost of education for young boys and girls. ADRA and World Food Programme have assisted households with food parcels as a mitigation measure to alleviate hunger, malnutrition and poverty in different households, especially the elderly, vulnerable and women. Due to the climate change, the crop harvests and quality of food produced have deteriorated and so ADRA provided households with beans, maize and cooking oil for a nutritious meal and source of energy especially for women because they spend most of their times working in the fields. World Vision implemented the WASH Project, which is in line with SDG 6 with a focus on the provision of clean water and sanitation. This assisted communities to combat the spread of diseases, protect women from being attacked as most of them would wait for the night to use the bush as toilet. It also lessened the burden of women who normally look after the sick because there were less waterborne diseases due to the project.

The Mbire District Council assisted in providing for land to implement projects, such as the Mushumbi Pools Crop and Livestock Innovation Centre. They also assisted with transport, money and food when there are funerals in the area. The District Council has also worked hand in hand with the Zimbabwe Wildlife Parks to track and kill problem animals which are attacking people or raiding the gardens of the villagers. Lastly, the government has offered knowledgeable information on agriculture and climate change from Agriculture Extension Officers.

### **5.3 Recommendations of the study**

The recommendations presented below are based on the findings of this study, and are stated as follows:

- It is recommended that the distribution of food parcels to the vulnerable and women from disadvantaged families should be increased per family so that they can be sufficient to meet household needs. The participants indicated that the donations they are getting from government and NGOs are not enough to sustain their livelihoods.

Hunger is becoming a real threat in the district due to changing weather patterns, less rainfall and crop destruction by wild animals. Therefore, communities require supplementary food sources to enable them to get through each season.

- The study recommends that the Zimbabwe National Parks and Wildlife should assist community members with feasible measures to combat the human and wildlife conflict because more lives are being lost, crops are being raided and destroyed and now school children have become more vulnerable as they walk to and from school.

Human and wildlife conflict remains a major issue, especially with the increasing competition for resources. As such, programmes that integrate wildlife, livestock and people are necessary to ensure co-existence.

- It is recommended that women should be engaged in more commercial projects so that they can work, produce and sustain their socio-economic livelihoods. Their yields have deteriorated and livestock are dying because of the effects of climate change, so more income generating projects will assist to combat food insecurity.

Although crop and livestock production are the major livelihood options among the inhabitants of Mbire District, there is need to diversify their options. This may include engaging in livelihood options outside of agriculture to ensure food self-sufficiency through income generation projects.

- It is recommended that contingency plans in case of disasters, such as floods, storms and violent winds are put in place in advance to be more responsive and effective. Disaster management is increasingly becoming a necessity in many communities such as Mbire District, where storms and floods are increasingly becoming frequent and more devastating. Community based disaster management planning should be piloted to readiness of communities for when such events occur.
- It is recommended that subsistent farming women should be involved in any decisions made by the government, especially when introducing new seed varieties. The involvement of women will ensure that decisions that are made take into consideration both the ideas, suggestions and concerns of women. Agricultural officers ought to engage with farmers on-farm in order to ensure that they have first-hand knowledge of the performance of the crop varieties that they are promoting. The feedback they get is also necessary to determine potential crop combinations to ensure household food security.

## REFERENCES

ADRA. (2019). Kanyemba Community Managed Disaster Risk Reduction Project. [online] Available at: <https://m.reliefweb.int/report/3160154> [Accessed on 21 September 2019]

ADRA. (2016). ADRA Responding to El Niño drought emergency in Africa. [online] Available at: <https://adra.org/adra-responding-to-el-nino-drought-emergency-in-africa/> [Accessed 21 Sept 2019].

African Wildlife Foundation. (2018). Water scarcity threatens Africa's people, wildlife and wild lands. [online] Available at: <https://www.awf.org/blog/water-scarcity-threatens-africas-people-wildlife-and-wild-lands>. [Accessed 5 July 2019].

Aronson, J. (1995). A pragmatic view of thematic analysis. *The Qualitative Report*, 2(1):1-3.

Homann-Kee, S.T., Tui, Senda, T., Dube, T., & Van Rooyen, A. (2018). Empowering women in integrated crop-livestock farming through innovation platforms in Zimbabwe. [online] Available at: [http://oar.icrisat.org/10421/1/Empowering%20women%20in%20Integrated%20Crop%20Livestock%20Farming\\_Final2.pdf](http://oar.icrisat.org/10421/1/Empowering%20women%20in%20Integrated%20Crop%20Livestock%20Farming_Final2.pdf) [Accessed 17 September 2019]

Bhattacharjee, A. (2012). *Social science research: principles, methods and practices*. 2<sup>nd</sup> Edition. Textbooks Collection 3. [online] Available at: [http://.scholarcommons.usf.eu/oa\\_textbooks/3](http://.scholarcommons.usf.eu/oa_textbooks/3). (Accessed 12 July 2019).

Brummer, D. (2002). Labour Migration and HIV/AIDS in Southern Africa. International Organisation for Migration Regional Office for Southern Africa. IOM

Belli R.F, Stafford, F.P & Alwin D.F. (2009). *Calendar and Time Diary Methods in Life Course Research*. SAGE Publications, Inc.

Baumgarten, M. (2010). *Paradigm Wars-Validity and Reliability in Qualitative Research*. Munich, GRIN Verlag.

Blanche, T. M, Durrheim, K. & Painter, D (eds). (2006). *Research in practice: Applied methods from the social sciences*, 2<sup>nd</sup> edition. Cape Town: UCT Press.

Brown, D. J. & Rogers, T.S. (2003). *An Introduction to the Theory and Practice of Second Language Research for Graduate/Master's Students in TESOL and Applied Linguistics, and Others*. Oxford University Press.

Buckingham, S. & Le Masson V. (2017). *Understanding Climate Change through Gender Relations*. Routledge: London.

Cable News Network. (2019). Fuelled by Climate Change, Zimbabwe's erratic harvest cause farmers with HIV to struggle. [online] Available at: <https://edition.cnn.com/2019/02/13/health/climate-change-zimbabwe-farmers-hiv-intl/index.html>. [Accessed 28 June 2019].

Channels, N. L. (1985). *Social Science methods in the legal process*. Rowman & Littlefield Publishers.

Chirisa, I. & Mabeza, C. (2019). *Community Resilience under the Impact of Urbanisation and Climate Change: Cases and Experiences from Zimbabwe*. African Books Collective, Project MUSE [muse.jhu.edu/book/63755](https://muse.jhu.edu/book/63755).

Chikodzi, D, Murwendo, T & Simba, F. M. (2013). 'Climate Change Variability in Southeast Zimbabwe: Scenarios and Societal Opportunities'. *American Journal of Climate Change*, 2(3A):11-30.

Currivan, D. B. (2011). Sampling Frame. [online]. Available at: <http://srmo.sagepub.com/view/the-sage-encyclopedia-of-social-science-research-methods/n884.xml> [Accessed 19 September 2019]

Dankelman, I. (2010). *Gender and Climate Change: An introduction*. Earthscan Publications.

Dey, I. (2005). *Qualitative data analysis: A user-friendly guide for social scientists*. eBook edition. Taylor & Francis. Available at [www.eBookstore.tandf.co.uk](http://www.eBookstore.tandf.co.uk)

Dilley M. (2000). Reducing Vulnerability to Climate Variability in Southern Africa: The Growing Role of Climate Information. In: Kane, S.M., Yohe, G.W. (eds) Societal Adaptation to Climate Variability and Change. Springer, Dordrecht. [https://doi.org/10.1007/978-94-017-3010-5\\_5](https://doi.org/10.1007/978-94-017-3010-5_5)

Ellis, F. (2000). *Rural Livelihoods and Diversity in Developing countries*. Oxford University Press.

FAO. (2018). Food and Agriculture Organisation's Work on Climate Change: United Nations Climate Change Conference, 2018. [online] Available at: <http://www.fao.org/3/CA2607EN/ca2607en.pdf> [Accessed 04 November 2019].

FAO. (2019). Dry land Forestry: [online] Available at: <http://www.fao.org/dryland-forestry/background/what-are-drylands/en/>. [Accessed 15 May 2019].

FAO. (2010). Fish Protection. Riparian Area Regulation. [online] Available at: <http://extwprlegs1.fao.org/docs/html/bc79365.htm>. [Accessed 05 July 2019].

FAO. (2018). Non-Wood Food Products. [online] Available at: <http://www.fao.org/forestry/nwfp/6388/en/> [Accessed 05 November 2019]

Food and Agriculture Organisation. (2014). Sustainable Wildlife Management and Wildlife Meat. [online] Available at: <http://www.fao.org/3/i5185e/i5185e.pdf>. [Accessed 05 November 2019]

Filippa, O. M. (2011). Zimbabwean adolescents' experience of their parents' absence due to Diaspora. [online] Available at: <http://uir.unisa.ac.za/bitstream/handle/10500/4656/dissertation-filippa.pdf?sequence=1> [Accessed 15 May 2019]

Fritz, H, Saïd, S, Renaud, P. C, Mutake, S, Coid, C. & Monicat, F. (2003). The effects of agricultural fields and human settlements on the use of rivers by wildlife in the Mid-Zambezi Valley, Zimbabwe, *Landscape Ecology*, 18:293-302.

Gandiwa, E. I, Heitkonig, M. A, Lokhorst, A.M, Prins, H. H. T, & Leewis C. (2013). CAMPFIRE and human-wildlife conflicts in local communities bordering northern Gonarezhou National Park, Zimbabwe. *Ecology and Society*, 18(4):7.  
<http://dx.doi.org/10.5751/ES-05817-180407>

Goodwin, J. (2012). *Secondary Data Analysis*. SAGE Publications.

Harding, J. (2013). *Qualitative Data Analysis from start to finish*. 1<sup>st</sup> edition. SAGE Publications.

Jaffee, D. (1998). *Levels of Social-Economic Development Theory*. 2<sup>nd</sup> edition. Westport, Connecticut: London.

Kahinda, J. M, Rockstrom J, Taigberu A. E & Dimes, J. (2017). Rainwater harvesting to enhance water productivity of rainfed agriculture in the semi-arid Zimbabwe. *Physics and Chemistry of the Earth Parts A/B/C*, 32:15–18

Kanga, E. M, Ogutu, J.O, Piepho J. O. & Oloff, H. (2012). Human–hippo conflicts in Kenya during 1997–2008: vulnerability of a mega-herbivore to anthropogenic land use changes, , *Journal of Land Use Science*, 7(4):395-406. DOI:[10.1080/1747423X.2011.590235](https://doi.org/10.1080/1747423X.2011.590235)

Krantz, L. (2001). *The sustainable Livelihood Approach to poverty*. Swedish International Development Cooperation Agency: Sida.

Mahan, M. (2019). Climate change is affecting HIV epidemics in Africa. Climate-related events such as drought are an HIV risk to already vulnerable population of women: Lesotho Case Study.

Kumar, R. (2011). *Research methodology: A step-by-step guide for beginners*. 3rd edition. London: Sage.

Lodico, M.G, Spaulding, D.T & Voegtle, H.K. (2010). *Methods in Educational Research: From theory to practice*. 2<sup>nd</sup> Edition. San Francisco, CA: Jossey-Bass.

Matemo, S. (undated). Livestock and competing claims a natural resource at the population-land-livelihood nexus in Mbire District in the Mid-Zambezi Valley, Zimbabwe. [online] Available at : <https://www.wur.nl/en/show/Livestock-and-competing-claims-on-natural-resources-at-the-populationlandlivestock-nexus-in-Mbire-District-in-the-MidZambezi-Valley-Zimbabwe.htm>. [Accessed 5 July 2019]

Mack, N., Woodsong, C., Macqueen, K.M., Guest, G. & Namey, E. (2011). *Qualitative Research Methods: A Data Collector's Field Guide*. Family Health International: USA

Mavhura, E. (2017). Building resilience to food insecurity in rural communities: Evidence from traditional institutions in Zimbabwe. *Jàmá: Journal of Disaster Risk Studies*, 9(1), a453. <https://doi.org/10.4102/jamba.v9i1.453>.

Mazara, G. (2017). Mbire, Chiredzi Communities Fight Climate Change. *The Sunday Mail*. 17 December. [Accessed 30 April 2019]

Madamombe E. K. (2004). Zimbabwe: flood management practices - selected flood-prone areas Zambezi basin. Integrated Flood Management, The Associated Programme on Flood Management. World Meteorological Organization / Global Water Partnership.

Makuvaro, V. (2014). Impacts of climate change on Smallholder Farming in Zimbabwe, Using a Modelling Approach. University of Free State.

Moore, T. & Cunningham, S. (2017). *Clinical Skills for nursing practice*. 1<sup>st</sup> edition. London: Routledge.

Mugandani, R, Wuta, M, Makarau, A & Chipindu B. (2012). Reclassification of agro-ecological regions of Zimbabwe in conformity with climate variability and change. *African Crop Science Journal*, 20(2):361-369.

Munodawafa, F.T. (2013). Assessment of the benefits of flood plains recession farming in Mbire District, Mashonaland Central Province in Zimbabwe.

Munang, R. & Andrews, J. (2014). Despite Climate Change. Africa can feed Africa. [online] Available at: <https://www.un.org/africarenewal/magazine/special-edition-agriculture-2014/despite-climate-change-africa-can-feed-africa> . [Accessed 05 November 2019].

Nakashima, D, Krupnik, I. & Rubis, T. J. (2018). Indigenous knowledge for climate change and assessment and adaptation. Cambridge University Press and UNESCO: Cambridge and Paris.

Neefjes, K. (2000). *Environments and Livelihoods: Strategies for Sustainability*. Oxfam Publishing.

Nkondze, M.B. (2014). The Impacts of Climate Change on Livestock in Swaziland: The Case of Mpolonjeni Area Development Area. *Journal of Agricultural Studies*, 2(1):

Nortjie, N., Visagie, R. & Wessels, J.S. (2019). *Social Science Research Ethics in Africa*. Springer Link

Oldreive, B. (1993). Conservation Farming for Communal, Small-scale, Resettlement and Cooperative Farmers of Zimbabwe, In: A Farm Management Handbook. Mazongororo Paper Converters (Pvt) Ltd, Zimbabwe.

Opie, C & Brown, D. (2019). Getting started in your educational research: Design, Data Production and Analysis. SAGE Publications.

Oxfam America and The Women's Environment and Development Organisation. (2009). Factsheet. Climate change and Women. [online] Available at: <https://s3.amazonaws.com/oxfam-us/www/static/media/files/climatechangewomen-factsheet.pdf> [Accessed 28 July 2019]

Pereira, L. (2017). Climate Change Impacts on Agriculture across Africa. [online] Available online at: <https://www0.sun.ac.za/cst/wp-content/uploads/2017/07/Pereira-2017.pdf>. [Accessed 2 November 2019].

Rubin, A & Babbie, E. (2009). *Essential Research Methods for Social Work*. 2<sup>nd</sup> Edition. Brooks/Cole. Cengage Learning.

Rubin, A & Babbie, E. (2010). *Methods for Social Work*. 7<sup>th</sup> Edition. Brooks/Cole. Cengage Learning.

Rust, J.M & Rust, T. (2013). Climate Change and Livestock Production: A Review with emphasis on Africa. *South African Journal of Animal Science*, 43:256-267.

Roller, R. M. & Lavrakas P. J. (2015). *Applied Qualitative Research Design: A total Quality Framework Approach*. The Guilford Press.

Saldana, J. (2012). *The coding manual for qualitative researchers*. 2<sup>nd</sup> Edition. SAGE: Washington DC.

Sati, P. V. & Vangachhia, L. (2017). *A Sustainable Livelihood Approach to poverty reduction. An Empirical Analysis of Mizoram, the Eastern Extension of the Himalaya*. Springer International Publishing

Simba, F.M. & Juwawa, C. (2017). Midseason Droughts Review for Smallholder Farmers in Buffalo Range, Zimbabwe. *IOSR Journal of Environmental Science, Toxicology and Food Technology*, 11(4):49-54.

Sithole, S. (2019). Zimbabwe- Massive Crop Damage by Elephants in Mbire District. [online] Available at: <https://africasustainableconservation.com/2019/04/09/zimbabwe-massive-crop-damage-by-elephants-in-mbire/> [Accessed 17 September 2019]

Seidman, I. (2006). *Interviewing as Qualitative Research: A guide for researchers in education and the social sciences*. 3<sup>rd</sup> Edition. Teachers College Press. London.

Smit, B. & Skinner, M. W. (2002). *Adaptation Options in Agriculture to Climate Change: A Typology*. Kluwer Academic Publishers.

Stemler, S. (2001). An overview of content analysis. *Practical Assessment, Research & Evaluation*, 7(17):1-6.

Taylor, G. R. (2005). *Integrating Quantitative and Qualitative Methods in Research*. 3<sup>rd</sup> edition. UPA.

The New Humanitarian. (2009). Quelea - The most hated bird in Africa. [online] Available at: <http://www.thenewhumanitarian.org/news/2009/08/19>. [Accessed 17 September, 2019]

Tshuma, R., & Mafa, O. (2013). *Research design*, in *Preparing your Dissertation at a Distance: A Research Guide*, edited by Tichapondwa, SM. Vancouver: Virtual University for Small States of the Commonwealth.

Tolich, M. & Iphofen, R. (2018). *The SAGE Handbook of Qualitative Research Ethics*. SAGE Publications.

United Nations Framework Convention on Climate Change. (2011). Fact sheet: Climate change science - the status of climate change science today. [online] Available at: [https://unfccc.int/files/press/backgrounders/application/pdf/press\\_factsh\\_science.pdf](https://unfccc.int/files/press/backgrounders/application/pdf/press_factsh_science.pdf). [Accessed 27 April 2019]

United Nations Development Programme. (2019). Cyclones Idai and Kenneth: International partners pledge support for reconstruction and resilience building for Mozambique. [online] Available at: <https://undp.int/report/mozambique/cyclones-idai-and-kenneth-international-partners-pledge-support-reconstruction>. [Accessed 28 June 2019]

United Nations Development Programme. (2011). Gender, Climate Change and food security. [online] Available at: [https://www.undp.org/content/dam/undp/library/gender/Gender%20and%20Environment/PB4\\_Africa\\_Gender-ClimateChange-Food-Security.pdf](https://www.undp.org/content/dam/undp/library/gender/Gender%20and%20Environment/PB4_Africa_Gender-ClimateChange-Food-Security.pdf). [Accessed 17 May 2019.]

Vogt, W.P, Gardner, D.C & Haeffele L.M. (2012). *When to use what design research*. Guilford Publications.

Wiles, R. (2012). *What are qualitative research ethics*. A & amp; C Black.

Wheeldon, J. & Ahiberg, M.K. (2012). *Visualising Social Science Research: Maps, Methods and Meanings*. SAGE Publications.

World Bank (2015), Addressing Climate Change threats to Zimbabwe's Water Resources. [online] Available at: [www.worldbank.org](http://www.worldbank.org) [Accessed 15 May, 2019.]

World Health Organisation. (2009). Gender, Climate change and health. [online] Available at <https://www.who.int/globalchange/GenderClimateChangeHealthfinal.pdf>. [Accessed 17 May 2019.]

World Bank. (2018). Accessing International finance through a Gender Equality dialogue on Gender Equality and climate change: Gender and Climate World Bank Group. [online] Available at: <https://www.climatefinancedevelopmenteffectiveness.org/regional-dialogue-event/img/session/G5-Gender-and-Climate-at-the-World-Bank-Group.pdf>. [Accessed 05 July 2019].

Yin, R. K. (2011). *Qualitative research from start to finish*. 1<sup>st</sup> Edition. The Guilford Press. New York. London.

Youseef, S. (2010). Controlling the stock holder and managing the business.

Zimbabwe National Contingency Plan (2012-2013). (2013). [online] Available at: <https://www.ifrc.org/docs/IDRL/Zimbabwe%20National%20Contingency%20Plan%202012-2013.pdf>. [Accessed on 17 September 2019]

Zukauskas, P., Vveinhardt, J. & Andriukaitiene, R. (2008). *Management Culture and Corporate Social Responsibility*. 1<sup>st</sup> edition. IntechOpen

## APPENDIX A: FOCUS GROUP PROGRAMME

Work programme for Field Data Collection Workshop for M.DVA Thesis on Climate Change and socio-economic livelihoods of rural women in semi-arid region of Mbire District.

Mushumbi Pools, Mbire District

Zimbabwe

### DRAFT WORK PROGRAMME FOR FOCUS GROUP

Time	Agenda Item	
<b>Background and Introduction</b>		
08:30 Session 1	<ul style="list-style-type: none"> <li>• Self-introductions (stating period they have stayed in Mbire District) and registration;</li> <li>• Overview of the objectives of the workshop;</li> <li>• Ground rules, ethical issues and signing consent forms.</li> </ul>	
<b>Perceptions/understanding of climate change effects</b>		
09:00 Session 2	<p>Eliciting information on perceptions on trends in the following effects of climate change:</p> <ul style="list-style-type: none"> <li>• Frequency of droughts, floods and violent storms and how they have been affected them over the years;</li> <li>• Amounts of rainfall being received over the years;</li> <li>• Patterns of the onset of seasons and ending of rain seasons.</li> </ul>	
<b>Household income activities</b>		
10.00 Session 3	<p>Eliciting information on agricultural activities being done and changes over the years</p> <ul style="list-style-type: none"> <li>• <b>Crop production (food &amp; cash crops)</b> <ul style="list-style-type: none"> <li>○ Types of crops grown for food consumption and cash crops why?</li> <li>○ How has the production been over the past years</li> </ul> </li> <li>• <b>Large &amp; small stock production</b> <ul style="list-style-type: none"> <li>○ Types of livestock reared and why?</li> <li>○ Has there been any shift or changes in types of livestock reared over years.</li> </ul> </li> </ul>	

Time	Agenda Item	
	<ul style="list-style-type: none"> <li>• <b>Gardening:</b> <ul style="list-style-type: none"> <li>○ Types of vegetables grown and whether there have been some changes in types of vegetable grown over years;</li> <li>○ Source of water for watering</li> </ul> </li> <li>• <b>Contributions of above activities to Household income</b> <ul style="list-style-type: none"> <li>○ Relative income from each of the above activities;</li> <li>○ The relative contribution of the activities to their socio-economic livelihoods</li> </ul> </li> </ul>	
<b>11.30: Morning coffee/tea break</b>		
<b>Natural resources and wildlife utilization</b>		
<p>12.00 Session 4</p>	<p>Eliciting information on current levels and trends in utilisation of natural resources:</p> <ul style="list-style-type: none"> <li>• <b>Timber</b> <ul style="list-style-type: none"> <li>○ The uses of trees for household need and commercial purposes and whether there have been shifts in patterns use;</li> <li>○ Trees being used for household timber needs and whether there have been changes in tree species availability</li> </ul> </li> <li>• <b>Non timber forest products</b> <ul style="list-style-type: none"> <li>○ Types of products harvested (e.g.Mupani worms, mushrooms and traditional vegetables);</li> <li>○ Whether there have been changes in types harvested.</li> </ul> </li> <li>• <b>Water resources</b> <ul style="list-style-type: none"> <li>○ Types of sources of water for household needs;</li> <li>○ Types of sources of water for livestock watering;</li> <li>○ Any trends in types of sources?</li> </ul> </li> <li>• <b>Wildlife Meat</b> <ul style="list-style-type: none"> <li>○ Sources of game meat and trends in supply levels</li> </ul> </li> </ul>	

Time	Agenda Item	
<b>13.00: Lunch break</b>		
<b>Human Wildlife Conflict</b>		
14.00 Session 5	<b>Types of conflicts and their magnitude e.g.</b> <ul style="list-style-type: none"> <li>○ Lion and Human</li> <li>○ Elephants, human and crops</li> <li>○ Baboons, monkeys and crops conflicts</li> <li>○ Quelia birds</li> <li>● Any shift or changes in type and magnitude of conflicts</li> </ul>	
<b>15.00: Afternoon coffee/tea break</b>		
<b>Measures in place to mitigate negative climate change effects</b>		
15.30 Session 6	<ul style="list-style-type: none"> <li>● <b>Internal adaptation measures</b> <ul style="list-style-type: none"> <li>○ What measures are being put in place to minimise negative effects observed above?</li> </ul> </li> <li>● <b>External measures</b> <ul style="list-style-type: none"> <li>○ Types of Support e.g. Education, materials, repair of damages infrastructure that is houses, roads, schools</li> <li>○ Drought relief programmes</li> </ul> </li> </ul> <p><b>LASTLY, THE GENERAL VIEW OF CLIMATE CHANGE</b></p>	
<b>16:30</b>	<b>End of Day</b>	-