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DEPARTMENT OF DISASTER RISK REDUCTION

THE IMPACTS OF CLIMATE CHANGE ON VULNERABLE COMMUNITIES. A CASE STUDY OF MBIRE DISTRICT, ZIMBABWE.

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR BACHELOR OF SCIENCE HONOURS DEGREE IN DISASTER MANAGEMENT SCIENCES

MASIMBA E. MAROWA

B223238B

SUPERVISOR: Dr Elisha. N. Moyo

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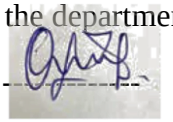
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(Thesis Supervisor): Dr Elisha N. MOYO 

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DECLARATION

Herein, I Masimba Erick Marowa swear that the work I am submitting has been conducted through independent investigation on my part and all the sources I have referred to in the process of conducting the work have been appropriately referenced. Furthermore, I declare that the work is submitted for the first time in this particular university/faculty and that it has not been submitted anywhere else before for the awarding of degrees. Signed

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DEDICATION

In honour of my parents, brothers, and sisters, and all the effort that was put into making this possible, it wouldn't have happened without you. You will all be remembered for the love, dedication, and encouragement you've shown me. This essay is also dedicated to Almighty God who guides me and gives me the inspiration to aspire to greater heights.

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To my parents and friends Mr and Mrs Marowa I extend my salute and thank you for the support throughout the way, not forgetting the assistance from my brothers and sisters, thank you very much. My friend Tatenda Mandevere, thank you for the assistance and encouragement, I value the camaraderie and support which we have experienced during our bachelor studies.

Finally, I sincerely thank Almighty God for his guidance and provision during this academic study.

ABSTRACT

Climate change poses increasing danger to the livelihoods and food security of vulnerable people in semi-arid areas of Zimbabwe. This study examined the effects of climate change on vulnerable groups of people in Mbire District, Mashonaland Central Province, with objectives of determining the existing climate-related challenges, identifying the most vulnerable groups, analysing socioeconomic and ecological impacts, and examining adaptation measures. The methodology adopted for this study included the use of qualitative case study design anchored within the framework of constructivism. Data collection included conducting interviews with fifty purposefully selected individuals, focus group discussions, and observations with the data being analysed using thematic analysis technique.

The findings indicated that climate-related challenges of recurring drought, unpredictable rainfall and increased temperature have led to poor crop yields, drying up of water sources, deforestation and degradation of soil. The affected groups are women, children, the old generation and those with disabilities. Social-economic implications involved food shortages, livelihood deterioration and lack of girl child education while ecological impacts include deforestation and increasing manwild life conflicts. Nutritional gardens proved to be the main adaptation measure employed but they face challenges such as inadequate supply of water.

The research findings point out that sustainable resilience calls for structural strategies such as solar-powered irrigation systems, seed banks, and enhanced extension services among others, together with the acknowledgment of the importance of Indigenous Knowledge Systems. Policymakers should ensure the inclusion of climatically smart strategies in rural development frameworks.

TABLE OF CONTENTS

APPROVAL FORM iii
DECLARATION iv
DEDICATION v
ACKNOWLEDGEMENTS vi
ABSTRACT vii
LIST OF TABLES x
LIST OF FIGURES x
ABBREVIATIONS x
CHAPTER 1: INTRODUCTION 1
1.1 Background of the Study 1
1.2 Problem Statement 3
1.3 Aim of the Study 4
1.4 Specific Objectives 4
1.5 Research Questions 4
1.6 Justification of the Study 5
1.7 Limitations of the Study 6
1.8 Definition of Key Terms 6
1.8.1 Climate Change 6
1.8.2 Vulnerable Communities 7
1.8.3 Climate Hazards 7
1.8.4 Resilience 7
1.8.5 Adaptation Strategies 7
1.11 Chapter Summary 10
CHAPTER 2: LITERATURE REVIEW 11
2.1 Introduction 11
2.2 Conceptual Framework 11
2.2.1 Climate Hazards 11
2.2.2 Vulnerability 12
2.2.3 Resilience 12
2.2.4 Adaptation Strategies 12
2.2.5 Indigenous Knowledge Systems 13
2.2.6 Synthesis of the Concepts 13
2.3 Theoretical Framework 13
2.3.1 Resilience Theory 13

2.3.2 Social Vulnerability Theory 14
2.3.3 Sustainable Livelihoods Framework 14
2.4 Literature review by objectives 15
2.4.1 To Evaluate the particular Climate Hazard(s) affecting Mbire District 15
2.4.2 To Identify the Most Vulnerable Groups and Their Levels of Exposure 15
2.4.3 Objective 3: To Analyse the Socio-Economic and Ecological Impacts of Climate Change 16
2.4.4 Objective 4: To Evaluate Existing Adaptation Strategies and Recommend Interventions 16
2.5 Empirical Evidence 17
2.6 Research Gap 17
2.7 Chapter Summary 18
CHAPTER 3: RESEARCH METHODOLOGY 18
3.1 Introduction 18
3.2 Research Methodology 19
3.3 Research Design 19
3.4 Population 20
3.5 Sample 20
3.6 Sampling Procedure 20
3.7 Instrumentation 21
3.8 Data Collection Procedures 21
3.9 Data Analysis 22
3.10 Ethical Considerations 22
3.11 Chapter Summary 22
CHAPTER 4: DATA PRESENTATION AND ANALYSIS 24
4.1 Introduction 24
4.2 Response Rate 24
4.3 Demographic Information of Participants 25
4.3.1 Gender Composition of Participants 27
4.4 Findings in Line with Research Objectives 28
4.4.1 Objective 1: To Assess the Specific Climate Hazards Affecting Mbire District 28
4.4.2 Objective 2: To Identify the Most Vulnerable Groups and Their Levels of Exposure to Climate Change 28
4.3.3 Objective 3: To Analyse the Socio-Economic and Ecological Impacts of Climate Change 29

4.3.4 Objective 4: To Evaluate Existing Adaptation Strategies and Recommend Interventions 32
4.4 Emerging Themes 33
4.4.1 Theme 1: Nutritional gardens as a recovery strategy 33
4.4.2 Theme 2: Challenges to sustainability 33
4.4.3 Theme 3: Opportunities for Resilience 33
4.5 Spatial and Environmental Findings 33
4.6 Chapter Summary 34
CHAPTER 5: DISCUSSION AND RECOMMENDATIONS 35
5.1 Introduction 35
5.2 Summary of Key Findings 35
5.3 Discussion of Findings in Relation to Literature 35
5.5 Recommendations 36
5.5.1 Policy Recommendations 36
5.5.2 Institutional Recommendations 37
5.5.3 Community-Level Recommendations 37
5.5 Suggestions for Further Research 37
5.6 Chapter Summary 37

LIST OF TABLES

Table 4.1: Response Rate by Stakeholder Category 24
TABLE 4.2: DEMOGRAPHIC PROFILE OF PARTICIPANTS 25

LIST OF FIGURES

Figure 1**:** Mbire District study area map (Mbire RDC Profile)**……...**9
Figure 2: Gender composition of HHQ respondents of KIIs, or respondents (Source: Authors) . 27

ABBREVIATIONS

CBDRM……Community-Based Disaster Risk Management

CSA……... Climate-Smart Agriculture

DRR……... Disaster Risk Reduction

EWS……... Early Warning System

FAO……Food and Agriculture Organization of the United Nations

FGD……Focus Group Discussion

GBV……... Gender-Based Violence

GHG……..Greenhouse Gas

HHQ……..Household Questionnaire

IKS……Indigenous Knowledge Systems

IPCC……..Intergovernmental Panel on Climate Change

KII……Key Informant Interview

NGO……..Non-Governmental Organisation

PLWD……Person(s) Living With Disabilities

SLF……Sustainable Livelihoods Framework

UNFCCC……... United Nations Framework Convention on Climate Change

ZIMVAC……Zimbabwe Vulnerability Assessment Committee

CHAPTER 1: INTRODUCTION

The extreme weather of El Niño has resulted in food insecurity for thousands of people, with crops failing and livestock dying. Mbire District in the semi-arid Zambezi Valley of Zimbabwe is a good example of environmental fragility and socio-economic vulnerability. Despite the importance of agriculture for rural populations in these areas, frequent climate events have been affecting the traditional agricultural systems, thereby aggravating poverty and reducing livelihood coping capacities. Climate variability impacts local resilience and leaves households at constant risk, as explained by Chanza and De Wit (2021), and by Bradshaw and Fordham (2022) women and other marginalised groups are the most affected. The study aims at examining the potential of ClimateSmart Agriculture, water harvesting, livelihood diversification and community-based disaster risk management in mitigating food insecurity, enhancing resilience and enhancing well-being of the community.

1.1 Background of the Study

Climate change has become one of the most significant 21st century challenges with implications for the ecosystem and socio-economic systems that impact the common people's life. The report of Intergovernmental Panel on Climate Change (IPCC, 2022) identifies most of the warming, irregularity in precipitation, and natural disasters as a result of the emission of greenhouse gases (GHGs) owing to human activities. It is crucial to note here that the impact of the climate change is experienced by the marginalised populations in terms of food insecurity, drinking water and other basic goods of living. In this context, vulnerable communities of all the world have begun to experience problems obtaining food, water and other essentials of life linked to the climatic changes.

The effects of climate change have a negative impact on vulnerable communities. It is pertinent to mention here that according to Bradshaw and Fordham (2022), the women folk, children and elderly people are the worst sufferers of the adverse effects of climate change as these groups of people have limited resources for dealing with such situations. The facts make it clear that it is a moral imperative to resolve the climate challenge as the poorest communities continue to be the worst hit while they did not cause it. Besides, the climate change also has adverse effects on the environment and is responsible for the extinction of many plant and animal species. Mapfumo and

Collinson (2020) point out that resilience needs to be reinforced and sustainable agriculture adopted as the only way people can survive in the new world order.

African countries are particularly vulnerable to the effects of climate change, as dependence on natural resources and agriculture are crucial to economic prosperity within the continent. According to Pereira (2017), a great vulnerability of these regions lies in using rain-fed production technologies which are poorly developed and extremely sensitive to climatic changes. This leads to a greater incidence of droughts, floods and temperature extremes which exacerbates poverty and food insecurity on the continent, leading to food insecurity in many households. Climate shocks are regularly occurring in Sub-Saharan Africa that are preventing development. Coping mechanisms like seasonal migration, use of natural resources, and informal economies tend to be unsustainable, according to Scoones (2019). Lack of infrastructure, lack of irrigation facilities and the absence of early warning systems increase the vulnerability of communities by making them more exposed to recurrent shocks.

Gender and social disparity is a driver of the climate vulnerability of Africa. According to Bradshaw & Fordham (2022), women who have to undertake the task of growing food and fetching water are burdened in times of drought. Women are also vulnerable to gender violence and contracting diseases when they have to walk for long distances in search of firewood and water particularly during drought periods as reported by Hove & Gwimbi (2020). Thus, adaptation policies need to be comprehensive and consider the needs of various social groups. Ecosystems degradation is also a big problem in Africa. Chikodzi et al. (2021) argue that due to unpredictable rains and warming effects, there has been deforestation, soil erosion and loss of biodiversity in southern Africa.

Zimbabwe is now facing climate change in the form of frequent droughts, unpredictable rainfall and temperature rises. Agriculture is highly vulnerable to climate hazards, which have rendered agriculture activities less sustainable, and socio-economic insecurity is also increasing in these dependent communities (Dongo, 2024). The district of Mbire is one of the most vulnerable districts due to its proximity to the wildlife corridors, lack of development and dependence on rain-fed agriculture. Chanza & De Wit (2021) emphasize that extreme temperature events, droughts and floods in the district of Mbire are making it an ideal study site for climate issues. As the climate hazards increase, communities in Mbire, and in particular the Korekore tribe, face the issue of food

insecurity, human-wildlife conflict and socio-economic insecurity. Less rainfall and frequent droughts reduce agricultural production and consequently have an impact on people's livelihood. Zvigadza et al. (2019) suggest that these factors, such as poor road access, lack of irrigation systems, and lack of preparedness, compound communities' vulnerability.

Mbire is especially affected by vulnerable groups like women, children, elderly and persons with disabilities. Bradshaw and Fordham (2022) call attention to the heavier workload during droughts for women who are mainly engaged in food production and collecting water within their homes. Hove and Gwimbi (2020) reported that the females have to walk a considerable distance to fetch water and firewood, thereby exposing them to a number of health risks and gender-based violence. The examples above demonstrate how the issue of climate change becomes one of social justice as an environmental issue.

In addition to its socio-economic impacts, climate change has also negatively impacted the environment in the Mbire district. Chikodzi (2021) reports about increasing deforestation, soil erosion and reduction in the biodiversity level due to temperature increase and unpredictable rainfall patterns. To address these challenges, Mapfumo and Collinson (2020) recommend improving the resilience of local communities through promoting good governance, sustainable land management and climate-smart agriculture. The government and development partners started some adaptation projects in the region such as the Community Based Adaptation Project and National Climate Policy adopted in 2017, in Zimbabwe, but Mukwada and Manatsa (2022) note that implementation challenges still remain.

The effects of climate change, therefore, necessitated this study to investigate the effects of climate change on vulnerable communities in Mbire District with the goal of documenting its economic and ecological effects and identifying ways to build the resilience of these communities. This will be done by integrating local knowledge systems, implementation of climate smart agriculture practices and involvement in climate adaptation planning.

1.2 Problem Statement

Although there has been an increased focus on the climate resilience issue at the national and international level, there still exists a big challenge in Mbire District. Households have been facing food insecurity and lack of food stability, as frequent crop failures, particularly of maize, are reported which is quite susceptible to mid-season dryness. Moyo et al. (2022) state that such

climatic hazards continue to happen with high frequency, impacting food security and livelihoods of people and their traditional farming practices. There is no uniformity in available adaptation measures, which are underfunded and not responsive to local needs.

The vulnerable target groups such as women, older people, young adults and subsistence farmers are affected by food insecurities, displacement, income loss and lack of institutions to buffer them from shocks to the system. Women who are tasked with producing food and collecting water are particularly impacted during droughts (Bradshaw & Fordham, 2022) and women who are travelling long distances to collect water and firewood are vulnerable to gender-based violence and other health issues (Hove & Gwimbi, 2020).

This is the reason this study tries to fill this gap, by studying the socio-economic and ecological impacts of climate variability and coping strategies used by the local communities in the Mbire District. The aim of this is to give an idea of what strategies are likely to be taken up in an inclusive way.

1.3 Aim of the Study

In general, the objective of the research is to determine the effects of climate change on vulnerable groups in Mbire district and suggest ways which will improve their resilience to adapt to climatic changes.

1.4 Specific Objectives

1. To assess the specific climate hazards affecting Mbire District.
2. To identify the most vulnerable groups and their levels of exposure to climate change in Mbire District.
3. To analyse the socio-economic and ecological impacts of climate change in Mbire District.
4. To evaluate existing adaptation strategies and recommend inclusive community-driven interventions for resilience in Mbire District.

1.5 Research Questions

1. What is the climate related hazards facing communities in Mbire District?
2. How do climate-related hazards affect different vulnerable groups such as women, children, the elderly, and persons with disabilities in Mbire District?

3. What are the socio-economic and ecological impacts of climate change on livelihoods in Mbire District?
4. How effective are current adaptation strategies, and what inclusive interventions can strengthen resilience in Mbire District?

1.6 Justification of the Study

The motivation behind this investigation is the necessity to learn about and react to the real experiences of people living in poor communities who suffer from climate change the most. Climate change in our planet is a real phenomenon that is having effects on the food security, health and the life of individuals, affecting their livelihood. The Intergovernmental Panel on Climate Change (IPCC, 2022) stated that the poorest population, whose emissions are the lowest, suffer the most impacts of global warming. In this regard, it makes sense to do a study that shows the experiences of the marginalised groups.

In Africa, climate change has exacerbated poverty and inequalities in the developing countries due to their reliance on rain-fed agriculture. A weak economy and reliance on rain-fed agriculture systems which are highly vulnerable to variability and extremes in climate are interconnected and explain why Africa is sensitive to climate change (Pereira 2017). Rural people have begun to devise alternative survival strategies, such as migration and small-scale trade, but these approaches, as Scoones (2019) indicates, are not sustainable and do not have the efficiency necessary to lower vulnerability.

The justification is even more compelling for Zimbabwe and Mbire District in particular. Mbire is located in the semi-arid region of the Zambezi Valley where frequent droughts, irregular rainfall and the increasing trend of warming climate have negatively affected traditional farming practices and exacerbated poverty. Chanza and De Wit (2021) highlight the significance of the districts such as Mbire as case studies that provide insights into the interaction between socio-economic and ecological conditions and climate change. The research will inform policy and practice by documenting these realities and giving recommendations for interventions that are inclusive and community driven so as to ensure that the most vulnerable are catered for in adaptation policies.

1.7 Limitations of the Study

Despite the efforts undertaken to contribute to the understanding of the effects of climate change on vulnerable populations in Mbire District, some limitations exist in the research. To start with, the research was conducted in one region only namely Mbire district. This is an area characterized by semi-arid climate located in Mashonaland Central province. In this regard, the results obtained in the study cannot be generalized to other districts or provinces in Zimbabwe.

In addition, the research made use of primary and secondary data, which were limited by factors such as accuracy and availability. Interviews from households are prone to recall bias because it is sometimes difficult for people to give a correct account of climate change events and strategies adopted in the past.

Third, the amount of time and resources available might affect the scope of data collection, which means that sampling might be limited to certain areas within Mbire. Climate change itself is a complicated issue and is shaped by many environmental, economic, and political elements. Despite these limitations, this does not devalue the research, but instead emphasizes the need to interpret the results carefully and conduct more studies building upon the current findings.

1.8 Definition of Key Terms

1.8.1 Climate Change

Climate change can be described as a long-term change in temperature and patterns of rainfall and weather extremes caused mainly by greenhouse gases produced by human activities. According to Moyo (2023), climate change is a “prolonged change of climatic variables over decades, characterized by a change of temperature, rainfall, and frequency of extreme weather occurrences, which is amplified due to human activity including land use changes and with particularly dire effects on semi-arid areas of southern Africa." As stated by IPCC (2022), these changes do not just constitute isolated occurrences but systemic alterations. For the purpose of this paper, climate change can be observed as recurring drought, erratic rainfall, and increased temperatures that have adverse impacts on agriculture.

1.8.2 Vulnerable Communities

Vulnerable communities refer to communities that do not have much resilience socially, economically, or infrastructurally, hence increasing their susceptibility to the negative effects of climate hazards. Bradshaw & Fordham (2022) state that while poverty contributes to vulnerability, social injustices are also critical determinants of vulnerability, whereby women, children, elderly people, and the disabled usually bear the brunt. The major source of vulnerability in Mbire is due to its heavy reliance on rain-fed farming and lack of infrastructure.

1.8.3 Climate Hazards

The risks associated with climate change include occurrences such as droughts, floods, and heatwaves, which can cause disruption to both human and environmental systems. As stated by Pereira (2017), the dependence of Africa on its unstable agriculture system means that the populations in question are very vulnerable to such risks. Drought is the common risk faced by the population of Mbire District.

1.8.4 Resilience

The risks associated with climate change include occurrences such as droughts, floods, and heatwaves, which can cause disruption to both human and environmental systems. As stated by Pereira (2017), the dependence of Africa on its unstable agriculture system means that the populations in question are very vulnerable to such risks. Drought is the common risk faced by the population of Mbire District.

1.8.5 Adaptation Strategies

Adaptation strategies are defined as planned actions that are taken to reduce the vulnerabilities and to enhance resilience to climate change. According to Scoones (2019), adaptation can be either a form of action by governments and NGOs or a type of community-led approach. In the district of Mbire, drought resistant crops, small-scale irrigation, migration and indigenous knowledge systems are adapted. However, as mentioned by Mukwada and Manatsa (2022), these strategies are often lacking in some form of deficiency, whether it be financial, capacity or cooperation.

1.9.10 Organisation of the Study

This study will consist of five chapters. Every chapter will be interconnected and the information contained in them will be relevant and understandable with respect to the problem being investigated.

Chapter one of this study gives the reader information regarding the study, which is the background to the study, statement of the problem, objectives of the study, research question, rationale and justification of the study, and definition of terms.

In chapter two, the relevant literature on climate change, vulnerability, resilience and adaption is reviewed. The review is based on the works of different continents such as Africa and Europe, and it presents any gaps identified after the literature reviewed.

The method used is described in chapter three. The design, study area, sampling method, data collection method and analysis strategy used in the study are explained here.

The results and analysis of this study is discussed in chapter four. The chapter presents the information regarding the climate hazard in Mbire district, susceptibility of people to climate hazards, socio-economic impact of climate change, and ecological impact of climate change and assessment of the existing adaptation measures.

Conclusions and recommendations of this study are discussed in the chapter five.
The study was conducted in three stages. The study proceeded, in three stages.

1.10 Delimitation of the study

The geographical scope of the present study is limited to Mbire District of Mashonaland Central Province in Zimbabwe, and focuses on communities in the semi-arid Zambezi Valley. Climate induced hazards including drought, floods and high/low temperatures are emphasized in this study because they occur frequently in the area and cause the most damage. This study further confines

itself to studying the vulnerability of specific social groups in the district including women, children, the old, disabled people and subsistence farmers.

Themes addressed in this study include socio-economic and ecological impacts of climate change, coping strategies of communities, and effectiveness of adaptation strategies by various actors (communities, NGOs and governmental institutions). However, the present study will not undertake a national survey on the impact of climate change and nor will it cover other types of climate hazards like storms or global economic downturns. Mbire District lies in the Zambezi Valley, which is a dry area in Mashonaland Central Province in Zimbabwe. Mbire District is located to the north western part of Zambia and the eastern part of Mozambique while Guruve District is located at its southern border. The district has major rivers such as Zambezi River, Angwa River and Mwanzamutanda River.

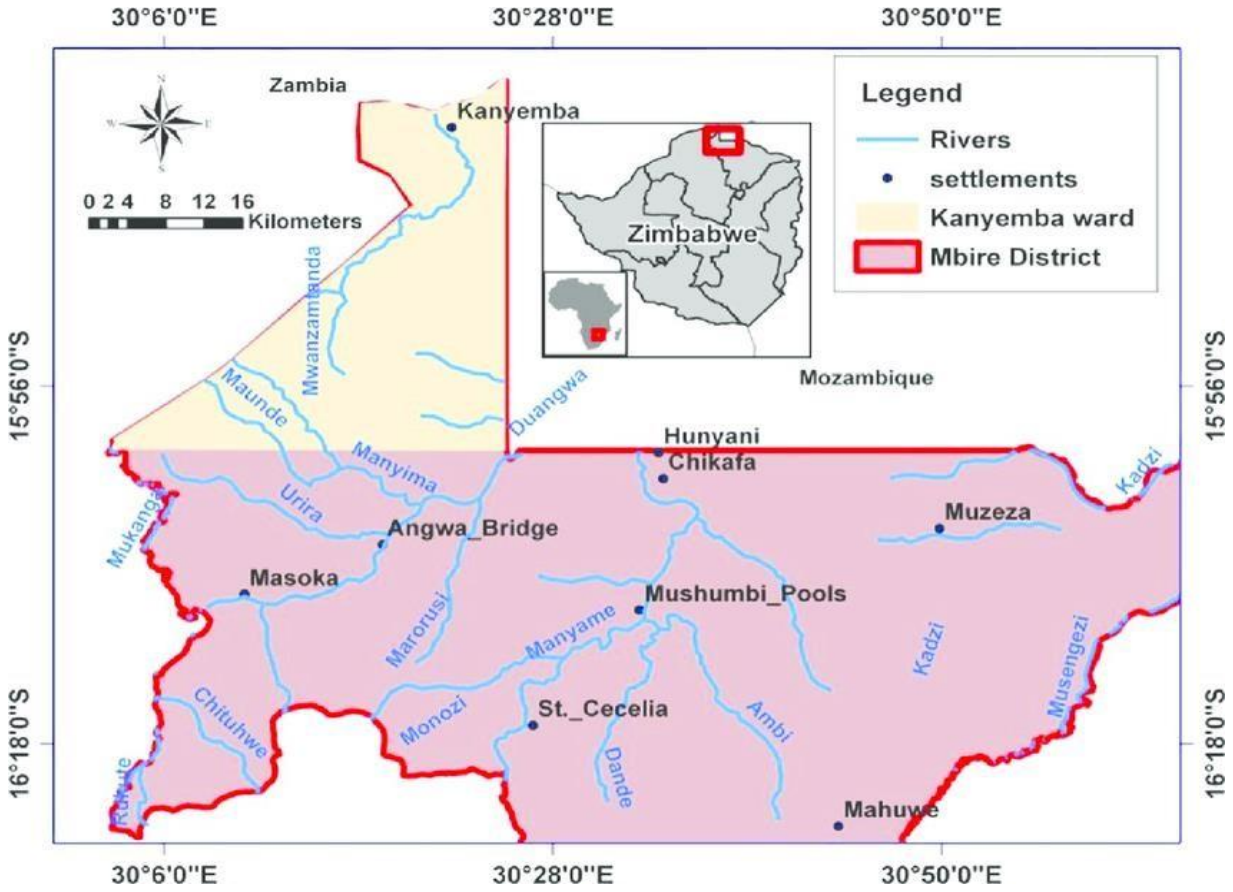


Figure 1: Mbire District Study Area Map (Source Mbire RDC Profile)

This region is defined by fragile ecosystems, drought, and erratic rains, which make it very sensitive to climatic variations. Some settlements within the region include Mashumbi Pools, Angwa, Msituro, and Kanyemba, and livelihoods are mainly centered on rain-fed farming. Situated near wildlife passages like the Chewore Safari Area and Doma Safari Area adds another dimension to the challenge of survival in an already difficult environment since climate variations often result in heightened human/wildlife interactions.

Infrastructure development is very limited due to poor roads, lack of irrigation systems, etc. This makes the region even more vulnerable to food insecurity and socio-economic instabilities. This region offers a unique case study of the impact of climate changes in Zimbabwe.

1.11 Chapter Summary

This chapter gave a brief introduction to the study by introducing the topic of climate change as a global crisis which has disproportionately affected vulnerable groups. It also narrowed down the scope of the study, narrowed to Africa and noted that Africa depends on rain fed agriculture and has infrastructural and social inequities that increase its vulnerability. The discussion then moved to Zimbabwe with particular attention to the Mbire district because of the frequent occurrence of drought, irregular rainfall and the high temperatures endangering the livelihoods of the people. The problem statement identified a gap in evidence on this specific context and the need to be inclusive adapted was part of the argument.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

One of the most pressing issues of this century, impacted by climate change, affecting ecosystems, economies and society with consequences on vulnerable groups. The impacts are especially harmful on rural populations that rely on nature's resources and lack adaptive capacity and infrastructure, as IPA 2022 has outlined. For Zimbabwe, drought, as well as unpredictable and increasingly higher temperatures, affect districts such as Mbire and hence harm the agriculture industry and poverty levels. Authors such as Chanza and De Wit (2021) emphasise the need to think in an ecologically and socially holistic way and Bradshaw & Fordham (2022) states that the burden of climate stress is disproportionately borne by women. In keeping with the objective of this study as outlined in Chapter One, pertinent academic material which relates to the study will be summarized in this chapter.

2.2 Conceptual Framework

This research study is informed by the conceptual framework which includes five key interlinked concepts; climate hazards, vulnerability, resilience, adaptation measures and Indigenous Knowledge Systems The above five concepts serve as an analytic approach towards understanding the effects of climate change as well as ways in which adaptation can be achieved These five key concepts illustrate the multi-dimensional approach of achieving climate resilience and adaptation.

2.2.1 Climate Hazards

Climate hazards are extreme events like droughts, floods, storms or heat waves which have adverse impacts on livelihoods and the ecosystem. Africa's agriculture systems were found to be extremely susceptible and highly dependent on rain based farming practices and thus very vulnerable to such hazards, Pereira (2017) cited. Climate hazards are not the only climate hazards, but are also socioeconomic hazards that cause instability of the food production system and water availability and displacement of people. Chanza and De Wit (2021) argue that the variability in climate undermines the resilience of communities making them vulnerable to hazards. Moreover, Scoones (2019) claims that when hazards occur the communities resort to non-sound practice, like deforestation and overgrazing.

2.2.2 Vulnerability

Risks can be deemed a form of vulnerability when an individual or a group's coping capabilities are weak or sub-optimal. Vulnerability extends beyond poverty and includes other social factors that make certain groups more vulnerable than others, like gender, age and disability, with women, aged persons and people with a disability being more vulnerable than children, women and aged persons are, and children are more vulnerable than people with a disability. Hove & Gwimbi (2020) identify vulnerability as multidimensional in nature including economic, social, and ecological vulnerability. Furthermore, vulnerability can be regarded as a dynamic phenomenon shaped by social, political and environmental factors throughout time.

2.2.3 Resilience

Resilience is the capacity to adapt to climate change, to withstand and recover from climate change impacts, and to adapt to climate change without compromising their livelihoods. Mapfumo and Collinson (2020) identified three pathways to resilience: Climate-smart agriculture, sustainable land management and good local governance. Resilience involves not just the process of adapting to cope with changes but the process of adaptation itself. In accordance with Scoones (2019) definition, resilience is a social and ecological concept where resilience is the reorganization of elements of the system without changing their identity and functionality. Crop diversification, small scale irrigation and labour pooling are some of the examples of how resilience is achieved in rural Zimbabwe.

2.2.4 Adaptation Strategies

Adaptation strategies: are acts and measurements which are undertaken for the purpose of reducing the effects of climate change. Scoones (2019) states that there are two types of adaptation: formal and informal, which may happen at government or NGO's initiative, or through community experiences. However, Mukwada & Manatsa (2022) suggest that financial challenges, technical expertise and coordination can have a negative impact on formal strategies. Inclusive adaptation, in which all actors are involved in decision-making processes, is essential (IPCC 20022). Some adaptations taken in Zimbabwe include; adaptation (climate smart agriculture), community disaster risk management plans and traditional practices like rain gathering and seed banking.

2.2.5 Indigenous Knowledge Systems

The IKS are cultural beliefs and practices that have been passed down from generations to generations by interacting through generations with their environment. IKS includes strategies from the local area, like rain-making, ecological calendars and the saving of rain seeds, among other practices, and is based on centuries of observations that place the focus on the environment. By bringing IKS into the mainstream of climate policies, Chanza and De Wit (2021) found that culturally appropriate and sustainable adaptation measures were developed. Mugambiwa and Tirivangasi (2017), note that IKS are flexible and change depending on the new challenges while Mapara (2009) points to the cultural nature of the indigenous practices.

2.2.6 Synthesis of the Concepts

The five concepts, namely: climate hazards, vulnerability, resilience, adaptation, and traditional knowledge systems, form the very essence of the conceptual framework for this paper. It is a prototype of the impacts of the climate change, a representation of how communities respond to impacts of climate change and how adaptation can be inclusive. From this synthesis, the multidimensional nature of adaptation and that it encompasses all of the above elements becomes evident.

2.3 Theoretical Framework

The analysis of the effects of climate change and adaptation takes place based on the theoretical framework. The research is grounded on three basic theories, Resilience theory, Social Vulnerability theory, and Sustainable Livelihoods framework.

2.3.1 Resilience Theory

Resilience theory was born in ecology with regard to the ability of systems to cope with disturbance, adapt and maintain essential functionality. At a later stage it became a socioecological system, with a particular focus on adaptation and learning. Folke et al. (2010) describe resilience as being built around various factors, including diversity, redundancy and feedback mechanisms that enable communities to withstand shocks and stresses from the outside world. In the context of climate change, resilience theory provides for the availability of multiple livelihood options, innovative approaches on resource management, and adaptation of institutions to climate change.

The concept of transformative adaptation in the resilience theory also applies to climate change impacts that call upon communities to move beyond coping and make transformative adaptations. In Zimbabwe, it is expressed in traditional practices and techniques, such as ecological calendar and forecasts of the weather conditions. Furthermore, transformative resilience considers anticipatory adaptations to prepare communities to predict future hazards and adapt the systems to reflect that.

2.3.2 Social Vulnerability Theory

According to Social Vulnerability Theory, the key factor is the unequal exposure to risk. Risk vulnerability is assessed by social, economic and political inequalities such that climate effects are inequitably distributed between communities. Women and children, the elderly and persons with disabilities, are more vulnerable as they do not have access to resources, according to Bradshaw and Fordham (2022). Hove and Gwimbi (2020) build on the concept of vulnerability as a multidimensional phenomenon which encompasses issues of poverty, health, infrastructure and social isolation. So, climate change becomes not an environmental issue, but a social justice issue because of social vulnerability.

Additionally, the notion of intersectionality is embedded in the Social Vulnerability Theory. Rural women in Zimbabwe, for example, who are forced to work out in the fields, are more vulnerable because of climate change, physical violence on journeys to seek water or firewood for example (Hove & Gwimbi, 2020). Climate changes have an impact on children too because it results in disruption of education, malnutrition and many other hardships. No elderly people and disabled are able to move freely and adjust to the changes.

2.3.3 Sustainable Livelihoods Framework

The Sustainable Livelihoods Approach (SLA) was put forward by Chambers and Conway (1992) as outlined by Scoones (2015) provides an all-encompassing perspective on livelihoods that are sustained by vulnerable groups. Communities use five main assets—human, social, natural, physical and financial to respond to the shock. The SLA state that it's important to have a diversity of assets so as to improve resilience.

SLA also emphasizes that institutional arrangements are also important factor in livelihood success. The differential access to types of assets is enabled by social relations, market processes,

and decision making processes, and therefore, it is not possible to consider adaptation without institutions. The need is felt that people can use their resources to cash in on sustainable livelihoods, but this is hindered by the lack of extension services, credit facilities and markets locally, hence the importance of the local Indigenous Knowledge Systems in the sense of adaptation.

2.4 Literature review by objectives.

The current literature review will be organised according to the Research Objectives; relevant literature will be used to cover all the Research Objectives. Through the literature review, the context of the climate hazards, vulnerable populations, socioeconomic and ecological impacts and possible climate adaptations will be explored to tie the theory presented in the study to the global, regional, and local climate context.

2.4.1 To Evaluate the particular Climate Hazard(s) affecting Mbire District.

Given this, one tool used for analysing how the community is protecting itself from exogenous stresses is the theory of resilience. The ability of a system to survive when challenged and to restructure itself and yet retain its essential nature. As for example when communities face a drought-flood situation, the agricultural system becomes disorganized, but the communities reorganize themselves through adapting practices, crop rotation, irrigation etc. The African continent is particularly vulnerable to any alterations in climate conditions, as they are closely dependent on rain-fed agriculture (Pereira 2017).

In the region, Scoones (2019) mentions that in Southern Africa droughts and floods are common occurrences and that it results in development reversals where families change their behaviours and take risks on deforestation and overgrazing. The effects of the climate variability of Mbire on the local scale makes households vulnerable because they lack resilience.

2.4.2 To Identify the Most Vulnerable Groups and Their Levels of Exposure.

Social vulnerability theory suggests that the exposure to hazards is not uniformly distributed among different social groups. Vulnerability is rooted in social, economic and political disparities. Bradshaw and Fordham (2022) observe that food production and water collection are considered to be more associated with women, making them more vulnerable. Similarly, gender-based

violence threats faced by women when collecting water and wood from far-off locations are detailed by Hove and Gwimbi (2020).

Besides, the risk is greater in the community involved in agriculture, such as rain-fed farming activities due to low technological development and poor infrastructure, Mavhura (2020) elaborates. Furthermore, Cutter et al. (2018) state that vulnerability is dynamic, based upon the ecological, social and governance attributes.

2.4.3 Objective 3: To Analyse the Socio-Economic and Ecological Impacts of Climate Change

Sustainable Livelihoods Framework provide a multidimensional lens about the livelihoods journeys of households to achieve sustaining the living in hardships by leveraging their human, social, natural, financial and physical resources. Mavhura (2020) reported that low productivity, food insecurity, migration and instability have occurred in Mbire due to repeated droughts. Besides, solar radiation in sub-Saharan Africa has become an environmental factor that necessitates ways for households to cope which are only viable in the short-term and fail longerterm (according to Scoones (2019)).

According to Chikodzi (2021) from an ecological point of view, the consequences are deforestation, soil erosion and biodiversity loss, which all contribute to making the environment unsustainable. According to Mapfumo & Collinson (2020) sustainable land management and smart agriculture will be the solution. The issue of wildlife-human conflicts due to the drought, in Mbire, further exacerbates the environmental problems.

2.4.4 Objective 4: To Evaluate Existing Adaptation Strategies and Recommend Interventions

If so, the importance of local and culture-specific practices according to the Indigenous Knowledge Systems theory cannot be underestimated in this adaptation context. According to Nyong et al., (2007), IKS has a centuries-old observation of the ecology and has beneficial approaches like rain harvesting, traditional calendars, and crop breeding. Incorporating IKS into the adaptation process increases inclusivity and cultural sensitivity (Mugambiwa and Tirivangasi 2017).

The adaptation strategies implemented in Mbire are crop varieties that can withstand drought, small-scale irrigation, and community based disaster risk reduction. However, according to

Mukwada and Manatsa (2022), the lack of resources, knowledge, and organization can have a negative impact on the effectiveness. Scoones (2019) makes the distinction between formal adaptation that is organized by Humanitarian organizations such as NGOs and government and informal adaptation that is based on local practices.

2.5 Empirical Evidence

There are some empirical evidence from all over Africa illustrating the impact of Climate change on people's livelihood. However, the coping mechanisms advocated by Scoones (2019) can for the most part not be sustained over time, such as migration, reliance on natural resources and small business enterprisement. Coping strategies may be able to resolve some issues, may however deplete natural resources and also may erode the social structure.

In a study carried out in Zimbabwe, Mavhura (2020) finds that decreased rainfall levels have significantly impacted agricultural production and resulted in food shortages. Similarly, Zvigadza et al. (2019) point out that poor infrastructure, poor irrigation system and poor early warning systems contribute to vulnerability of local communities to climate change.

Based on the findings of the research undertaken by Chanza & De Wit (2021), it is important to recognise the case of Mbire as there are many other examples in this district where climatic hazards interacts with other social and economic challenges such as poverty, gender-based discrimination and environmental degradation. Empirical evidence demonstrates the contribution of IKNs in adaptation, in African communities, for instance, where measures such as seed storage, rainwater harvesting, ecological calendar are in use, because of their ability to adjust to climate changes. (Nyong et al., 2007).

2.6 Research Gap

Global and regional studies have studied climate change impacts and adaptations; however, there are limited studies that have considered the impacts of climate change in the Mbire District context. African literature on climate change always has a tendency of being generalised irrespective of socio-cultural and ecological conditions for adaptations in Africa.

Chanza and De Wit 2021 argue that in Zimbabwe, the prevailing scientific worldview dominates the debate around climate change, sidestepping traditional ecosystems and causing disconnects

between policy initiatives and the reality on the ground. There is need to document local practices particularly in rural areas of Zimbabwe - such as Mbire District where people are climate dependent for their livelihoods - as noted by Mutasa (2015). This is because there is a paucity of information relying on evidence to design effective strategies for adaptation with cultural sensitivity.

This study is designed to bridge this gap by providing local information and evidence of climate risks, vulnerabilities, impacts and adaptation within the context of Mbire District.

2.7 Chapter Summary

In the discussion presented in this chapter, the conceptual, theoretical and empirical literatures were reviewed in the context of research. The conceptual framework took into account the relationship between vulnerability to climate hazards, resilience and adaptation. Theories that were used to understand the research objectives were various as resilience theory, social vulnerability theory and the sustainable livelihood framework. Empirical studies delivered evidence on how the climate changes adversely affected the livelihoods of the people of African nations, including Zimbabwe.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

The methodology employed to conduct the research for establishing climatic changes effects on vulnerable population in Mbire district is described in Chapter Four. The procedures adopted in gathering and analyzing the data is elaborated in detail for achieving the objectives of the study.

The design, location, population, sampling, data collection and data analysis are described when carrying out the research. The ethical concerns, validity and reliability concerns with the data collected are pointed out.

3.2 Research Methodology

This study used qualitative case study methodology in investigating the impact of climate change to the Mbire district. According to Yin (2018), case studies are highly recommended when conducting an investigation to answer how and why questions, especially when it is difficult to separate the phenomenon being studied from its context. Thus, the Mbire district was seen as a closed system where general lessons could be learned on the realities of rural vulnerability and adaptation to climate change. The qualitative approach adopted was informed by the constructivist paradigm that believes that the truth of anything depends on the subjective construction of the reality and thus needs to be studied by understanding the meanings individuals give to their experience. Creswell and Creswell (2018) argue that this is a highly efficient means of exploring stories and experiences, and therefore, it is suitable for capturing farmer voices, voices of women, children, elderly, and persons with disabilities.

Data source triangulation was used to increase the credibility of the data. The more techniques used, the more credible the research data will be (Patton, 2015). Interviews, discussion groups and direct observation were used for triangulation and secondary sources such as government, NGO reports and climate change records were also utilized.

3.3 Research Design

This research is based on the principles of participatory research which stress the need for participation in knowledge generation. Participation does not just refer to the use of particular methodology but it is a politics that promotes the democratization of research itself. This being the case, the farmers and community leaders in Mbire District were considered co-producers of knowledge who played key roles in the definition of research questions, interpretation of findings and validation of findings. Methodologically speaking, the research went through iterative stages which characterized the process of participatory research. At the first stage, there was the process of engaging stakeholders in order to lay a foundation of trust and explain the reasons behind the research. The next step was to collect data using different techniques such as semi structured

interviews, focus group discussions and observation. The third stage involved doing thematic analysis during which Braun & Clarke (2021) emphasize the need for systematically coding qualitative data.

3.4 Population

The study calls for Mbire district stakeholders directly affected by climate change as the target population. The farmers and the subsistence households constitute the major part of the population because these individuals largely depend on agriculture that depends on rainwater and thus are highly prone to droughts, unreliable rainfall patterns and high temperatures. People in such situations typically cope by moving elsewhere or by doing some form of small business, but that's not sustainable, says Scoones (2019). Vulnerable groups such as women, children, elderly and persons with disabilities have been incorporated in the population. Women are at the forefront of the impact of climate shocks with most of the burden because they are engaged in food production and fetching water resources (Bradshaw and Fordham, 2022). Village heads have been included owing to their pivotal role as intermediaries for accessing resources as well as coordinating community actions. Extension agricultural officers and the members of the NGO have been included in the population because they are engaged in agriculture (Chanza & De Wit, 2021).

3.5 Sample

Purposive sampling was used in the selection of respondents in the study, following the principle of selecting individuals who have experienced climate hazards and adaptation measures in Mbire District. According to Patton (2015), this sampling technique is especially suitable for qualitative studies where the researcher specifically chooses the cases which can provide an understanding of the phenomenon under investigation. A total of 50 participants were interviewed using a structured and an unstructured interview approach and FGDs. Creswell and Creswell (2018) stated that qualitative research does not require large sample sizes, it is the quality of the information collected. There was a stratified sample in this study and that consists of:

3.6 Sampling Procedure

This process was carried out in three separate stages. To recruit the most potential respondents, consultations were held with chiefs and the district administration in the first stage. From Patton (2015) it is clear that consultations are vital to qualitative research; they develop rapport, set the

direction of the study and make sure that the selection of participants for the study is suitable to the context of the study.

The list of participants was developed in the second stage using participatory methods. Participatory research can be defined as a process in which the local population is active, engaged and involved in different phases of the research. In the third step the researcher personally invited each of the respondents, having ensured that the proper procedures for the informed consent had been followed. Creswell and Creswell (2018) expand upon the ethical issues in qualitative research.

3.7 Instrumentation

Qualitative, because the study aimed to obtain information about how it is experienced by the individual and the community's responses to the subject of climate change. The instrument mainly used was interviews which were conducted to elicit detailed information on the experiences in the various groups including farmers, village heads, extension officers and NGO officials. Kvale and Brinkmann (2015) state that interviews could be an appropriate tool for doing qualitative studies because they are flexible yet structured, allowing the exploration of new topics.

Another approach to obtaining information on community experiences was through focus group discussions (FGDs). FGDs provide opportunity for an open discussion and reflection among participants, which can help to build collective knowledge through discussion. Observation checklists were used to record observations of different farming practices, water harvesting practices and coping strategies. A literature review was also done to complement the primary data.

3.8 Data Collection Procedures

The farmers, village chiefs, extension officers and NGO workers were interviewed using semistructured interview with a duration of 30 minutes to 60 minutes. Semi-structured interviews were conducted in both English and Shona, making it easy to understand and consider the cultural context. Discussions were held among focus groups of six to eight people, engaging in conversation in order to verify their common experience in addition to exploring indigenous practices. During the fieldwork, observations were made on practices of farming, water harvesting and coping mechanisms. According to Patton (2015), observations add credibility to the qualitative

study as they are a source of information based on what is actually happening. Literature review was conducted to add credibility to primary data that was gathered in this research.

3.9 Data Analysis

Thematic analysis is considered as one of the flexible and systematic research method in analysing data, according to Braun and Clarke (2021) that is used for recognizing, analysing and interpreting at patterns in the qualitative data. Therefore, thematic analysis was adopted as a method for data analysis in this study. Thematic analysis is in-depth reading and re-reading of the transcripts gathered from the interviews and focus group discussions, and familiarisation with the data before coding the data into themes relevant to the research objectives. Themes identified were: climatic risks, vulnerability of groups, socio-economic and environmental effects and coping measures. Descriptive analysis of quantitative data like data on rainfall and crop yields was also done. Descriptive statistics can be used in qualitative analysis as they provide supportive information and facts to validate the themes identified from the narratives as Creswell & Creswell (2018) explained.

3.10 Ethical Considerations

Bindura University of Science Education granted the ethical approval for this research project ensuring that the study was adherent with the institutional guidelines on ethics. Ethical clearance plays a significant role in qualitative research as it safeguards the participants of the study and makes the research process legitimate (Creswell and Creswell, 2018). The informed consent was considered a process as opposed to a one-time event; it was done in both English and Shona languages. During this process the issues of confidentiality and anonymity were strictly observed. Anonymity of participants should be ensured in qualitative research particularly when dealing with sensitive issues, as per Cohen et al. (2018). It must be recognised that particular mention was given to the more vulnerable members of society, like women, children, the elderly and persons with disabilities.

3.11 Chapter Summary

The details of the approach undertaken in this study are already given in this chapter. With the application of a qualitative case study approach along with purposive sampling and participatory

approach to the study, the actual life situations of the vulnerable groups living in the district of Mbire have been brought out. The results referred to in Chapter Four have been based on these methodological aspects.

CHAPTER 4: DATA PRESENTATION AND ANALYSIS

4.1 Introduction

In this chapter, the study's results will be presented and discussed with respect to the study objectives set out in chapter one. Adhering to Creswell & Creswell (2018), results must be presented in an orderly fashion by answering research questions. As said by Yin (2018), results presentation and analysis should focus on the patterns of the data, but should show the importance of the data in relation to theory and practice. The study combines the quantitative data from the surveys and the qualitative data from the interviews, to develop an understanding of the impact of climate hazards on the community.

4.2 Response Rate

Respondents in each of the six stakeholder groups involved in this study were distributed as presented in Table 4.1 below. Purposive sampling was done to select 50 respondents from each of the stakeholder categories, so as to have a mix of experience, age, gender, and institutional affiliation.

Table 4.1: Response Rate by Stakeholder Category

Stakeholder Group	Number of Respondents	Percentage	Contribution to Study
Women	15	30%	Shared experiences on food production and water collection
Elderly	10	20%	Provided insights into mobility challenges and long-term climate impacts
Persons with Disabilities	5	10%	Highlighted barriers to adaptation and access to support systems
Youth	10	20%	Contributed perspectives on migration, employment, and innovation
Community Leaders & Village Heads	5	10%	Offered governance perspectives and community mobilisation strategies

Agricultural Extension Officers	5	10%	Provided technical knowledge on farming practices and resilience
Total	50	100%	Full engagement ensured credibility and inclusiveness

As seen from Table 4.1, women represented the biggest group with 30% (15) of the participants in the study owing to the critical role they played in securing the households from a food point of view and in managing the natural resources. The young and the elderly also each formed a fifth of the study population (10 each) to ensure that views from both past and future standpoints were well captured. Leaders in the community, extension officers in agriculture, and people living with disabilities each formed one-tenth of the participants (5 each). By ensuring that the participants represent a cross section of the community, it is intended to capture the complex phenomenon of climate change vulnerability from different dimensions.

4.3 Demographic Information of Participants

The participants in the study ranged in terms of ages, educational backgrounds, and levels of farming experience. In terms of ages, most of the fifty participants who responded to the questionnaire were middle aged, with twenty-five participants being in the middle age category. This reflects the important role middle aged farmers play in maintaining the nutritional gardens and food security of households. In terms of education level, twenty respondents had received secondary level education, ten had primary level education, and five respondents had completed tertiary education.

In addition, in relation to farming experience, fifteen participants had been in the field for less than five years. Twenty other participants were those that had been farming between five and fifteen years. On the other hand, fifteen of the participants had been farming for more than twenty years.

Table 4.2 below highlights the demographics of the fifty participants who participated in this study.

TABLE 4.2: DEMOGRAPHIC PROFILE OF PARTICIPANTS

Demographic Category	**Number of Participants**	**Key Insights**

Middle-aged Farmers	25	Active role in sustaining nutritional gardens
Secondary Education	20	Greater openness to adopting new practices
Primary Education	10	Limited exposure but strong reliance on traditional methods
Tertiary Education	5	Provided advanced perspectives on adaptation and innovation
Farming Experience < 5 years	15	Newcomers offering fresh approaches
Farming Experience 5–15 years	20	Balanced view of challenges and coping strategies
Farming Experience > 20 years	15	Deep historical knowledge of climate variability
Total Participants	50	Diverse representation across age, education, and farming experience

As seen from Table 4.2, the demographic breakdown of respondents demonstrates a well-planned approach that considered diversity in three main categories: age, educational background, and farming experience. The majority of respondents belonged to middle-aged farmers (25 out of 50), implying that middle-aged farmers are the main actors in daily agricultural activities aimed at achieving food security. Concerning educational background, most respondents were secondaryeducated farmers (20 respondents), indicating a good degree of literacy and access to formal agricultural information. The number of tertiary educated respondents was much lower (only 5 respondents); therefore, it is safe to say that they have contributed a bit more to the project due to their technical backgrounds. Primary-educated farmers (10) could give their practical

insights based on their own life experiences. With respect to farming experience, the distribution into three experience groups under five years of experience (15), from five to fifteen years (20), and over twenty years (15) ensured that new farmers and established ones were included in the sample.

4.3.1 Gender Composition of Participants

As illustrated in Figure 4.1, females formed the largest proportion among the study respondents, representing 60% (30 participants), while males accounted for 40% (20 participants). The reason behind this is the socio-economic situation in Mbire District, whereby males leave home to seek employment opportunities, thereby making women be responsible for managing their homes and nutrition gardens. As noted by Bradshaw and Fordham (2022), the views of women are essential in conversations on resilience because they are responsible for growing food, diverse diet, and water collection.

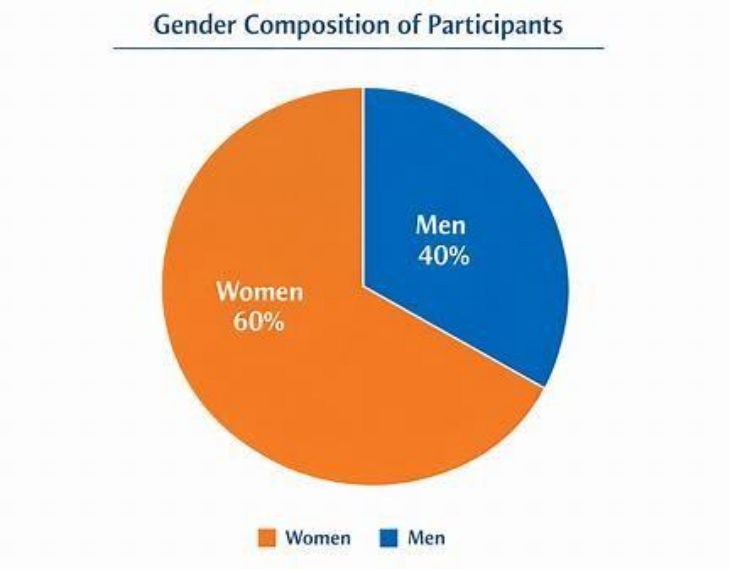


Figure 2: Gender composition of HHQ respondents of KIIs, or respondents (Source: Authors)

The gender demographics indicated in Figure 4.1 have several implications when it comes to interpreting the results obtained through this study. The dominance of women amongst the participants was not by chance but a reflection of the reality in rural settings in Mbire district, where male migration out of the area for work purposes has made the women the key players in securing food in their homes and utilizing natural resources. These demographics imply that there

will be more insight in this study into coping mechanisms regarding climate change, such as nutritional gardening, water sources, and eating in times of need. With men only constituting 40% of the study population, the voices of the dominant gender were not completely left out of this study.

4.4 Findings in Line with Research Objectives

In this section, the results emanate from semi-structured interviews, focus groups discussion, and field observation. These results are categorized in line with the research objectives for which they were gathered, based on the research tools used. As stated by Creswell and Creswell (2018), linking results with objectives helps provide coherence in analysis, while using various instruments improves validity.

4.4.1 Objective 1: To Assess the Specific Climate Hazards Affecting Mbire District

During interviews , drought , flood , and heat waves were named as the most common dangers that the community actually faced. Farmers described going through long dry spells where maize and vegetables get ruined , and then in other moments floods would sweep off their garden farms near the rivers. What we saw on the ground matched these stories , because dried-out garden land, cracked soils, and wells that had already gone dry were visible in a number of farms. This made it pretty clear that the hazards were not just talked about but really serious. As one elderly man explained , "The sun is becoming too hot nowadays , even our wells dry up well before the season is over," and he went on to say, "When the floods come , everything gets swept away from our garden including the crops we had already worked on." Scoones (2019) also notes that droughts in Zimbabwe’s semi-arid areas tend to return in cycles, and in recent times they are turning more severe . Meanwhile Mavhura (2020) adds that floods worsen the whole situation, especially through soil erosion and harm to infrastructure. Overall, drought came out as the most reported hazard, and then came heatwaves followed by floods.

4.4.2 Objective 2: To Identify the Most Vulnerable Groups and Their Levels of Exposure to Climate Change

Women, the elderly, and people living with disabilities were the most vulnerable to climate impacts, this was shown through interviews and focus group discussions. In most cases, women still carry the load of collecting water, maintaining gardens, and feeding the family, and the elderly,

well, they struggle to move around when drought times come. For PLWDs, access was often restricted, especially in terms of irrigation equipment , and also extension services. “ Men go out of town in search of jobs while we stay behind to take care of our gardens and children ” one female participant commented , like it was normal but it really wasn’t. What Bradshaw and Fordham (2022) describe as gender inequality and vulnerability, really matters here because it helps explain how women and other vulnerable groups get hit harder by adverse effects of climate change. Also, Scoones (2019) points out that coping mechanisms depend a lot on resource availability, mobility and social networking, rather than just what people want to do in theory.

4.3.3 Objective 3: To Analyse the Socio-Economic and Ecological Impacts of Climate Change

Information regarding the socio-economic and ecological impacts that come about as a result of climate change in Mbire was gathered through interviews, focus group discussions, and field observations. It was common for participants to describe how the constant drought, unpredictable rains, and temperature increases have affected agriculture, reduced their earnings, and degraded the environment in which they make their living. The impacts are divided into two categories as follows:

Socio-Economic Impacts

Food insecurity was flagged as the most prevailing social, economic impact of climate change in the district of Mbire, and well, it seemed to be the one that kept coming up most. It was suggested that the dry spells that show up mid-season led to weak maize yields, with maize still being the main sustenance and also the thing that fills most food stores for the following months. “We cultivated, but there was no harvest. We did not eat for three months because there was nothing in our granaries,” said one elderly woman during the personal interview, and her account sounded very direct. What farmers said also matches the findings of Moyo et al. (2022), where the incidence of mid-season dry spells is described as increasing across semi-arid parts of Zimbabwe, and this then triggers food insecurity and malnutrition among local communities. Also, the Food and Agriculture Organization of the United Nations (FAO, 2021) notes that food deficits are common in sub-Saharan Africa, especially among rain-fed smallholder communities where rainfall is basically the main lifeline. Losses in livelihoods were tied to this same food insecurity.

Respondents mentioned that livestock became scarce because pasturelands were not being accessed properly and waterholes stayed dry for longer periods. On top of that, the money people would normally get from selling crops dropped markedly. Scoones (2019) explains that livelihood degradation in semi-arid areas of Africa builds up through the cumulative effects of repeated weather events, meaning households gradually lose their productive assets, and then they end up more impoverished, and they find it harder to cope over time. In Mbire, this livelihood erosion was observed through the weakening of informal markets that usually rely on crop surpluses. Extension workers reported lower harvests, so fewer things were sold in those informal markets. In turn, incomes went down, and households were left without enough cash to purchase food, medicine, and school materials, which then feeds into the cycle again.

The impact of climate change on socio-economic factors showed up in a pretty clear gendered way in the collected data, you could say. Women, who are the largest group among the respondents and who manage the household food and water supply, described that their workload had gone up when the climatic conditions started getting worse. “If there is no water close by I have to walk for two hours to fetch from the river.” “I am too exhausted to cultivate my garden when I come back home”, a female interviewee explained. Bradshaw and Fordham (2022) note that climatevulnerable women face additional burdens because they are deeply involved in producing food, collecting water, and making sure their children are fed properly, and yes, those duties rise a lot during drought. As Hove and Gwimbi (2020) also explain, the longer distance travelled for water and wood can expose women to health issues, and it can also increase the risk of gender-based violence. One more consequence that came up from the respondents was the way weather changes affect school attendance and children’s diets. Because food insecurity has been growing, many households ended up removing children from school, especially girls, so they could help at home during dry periods. Dongo (2024) adds that climate shocks deepen the already existing inequality in education in rural Zimbabwe, since families are pushed to redirect their children’s energy toward survival and subsistence tasks, rather than schooling.

Ecological Impacts

Degradation of the environment appeared prominently in all data sets. Deforestation was evident from the field observations where significant amounts of woodland were being cut down for use

as charcoal and firewood due to alternative income needs and alternative sources of energy when crop productivity was low in times of drought. The effects of deforestation in terms of soil erosion, water infiltration, and loss of diversity were reported by Chikodzi (2021). These were evident in Mbire where the riparian vegetation along the seasonal river was sparse, and evidence of sheet erosion was seen in areas adjacent to the nutritional gardens and homesteads.

The other environmental factor highlighted was soil degradation and was seen by farmers and extension workers alike as an important ecological challenge. Poor fertility was cited as due to lack of organic content and grazing of already dry land, coupled with failure to allow for soil rest. One farmer said, "The soil is now like sand; nothing holds water and crops die quickly." According to Mapfumo and Collinson (2020), soil quality is an important factor determining crop productivity and resilience. In particular, the gradual degradation of the quality of soil witnessed in Mbire poses the threat of rendering considerable areas of land infertile, thus establishing a vicious circle in which the environment degrades even further socio-economic conditions.

One more ecological impact experienced by the participants was associated with the drying up of water sources. Communities no longer enjoy year-round access to surface and ground water from seasonal rivers and wells. "The borehole used to be there year round but nowadays it dries up in August," one of the community leaders noted. Indeed, the findings resonate with the views of Chanza and De Wit (2021) who observe that climate change and decreased and unpredictable precipitation have progressively made water sources less reliable in Mbire. The IPCC (2022) predicts increased water stress for semi-arid areas of Southern Africa due to projected future warming and, hence, a further worsening of water security among the communities of Mbire.

Human-animal conflict emerged as another ecological impact affecting socio-economic conditions of life. With water resources being scarce and foraging becoming less abundant during periods of drought, animals invaded agricultural fields and human settlements searching for food and water. In relation to ecological issues, crop raiding by elephants and baboons was cited as the most significant problem associated with agricultural loss. As one farmer observed, "The elephants raided our entire maize field in one night leaving us without anything to harvest." According to Mavhura (2020), in Zimbabwe, human-wildlife conflict is made worse by climate-induced habitat degradation that leads to encroachment of wildlife into areas where people live thereby posing

threats to the well-being of both. This ecological consequence is an area that needs more attention in future adaptation strategies.

From all the socio-economic and ecological consequences of climate change explored in this section, it is clear that climate change effects are highly interrelated. Soil degradation results in low crop productivity hence making food insecurity worse while limited water supply puts women at a disadvantage since it reduces their time for household duties. Chikodzi et al. (2021) stress that these effects compound because of the nature of the southern African semi-arid regions, whereby socio-economic and ecological vulnerability interact in such a way that breaks can only be made through persistent multi-sectorial efforts. These results show the need for adaptation measures that incorporate all three factors in relation to climate vulnerability in Mbire district.

4.3.4 Objective 4: To Evaluate Existing Adaptation Strategies and Recommend Interventions

From interviews and FGDs, a certain set of adaptation methods currently being implemented in Mbire District was seen. Uh, these are things like crop diversification, seed preservation, and water management. A lot of respondents mentioned that farmers have moved away from mainly maize, to other drought tolerant crops such as sorghum, millet and cowpeas. One farmer said, "We grow mixed crops since if maize doesn't do well, there will be something from sorghum" , and you could feel the point there, it is a kind of risk spreading not just a random choice. Seed preservation was also singled out as an important resilience approach. "We save our own seeds because those bought from shops cannot thrive in case of late rains," explained a village head, stressing that Indigenous seed practice is better than others. In other words, seed preservation connects with Scoones' (2019) ideas on seed sovereignty, where communities keep control over planting material. On top of that, extension services plus NGOs backed adaptation through climate smart agricultural initiatives. Still, respondents felt that guidance and resources are not enough for what is supposed to continue, as one extension officer noted, "Once trained, we are left to struggle." And according to Mukwada and Manatsa (2022) sustainable adaptation requires continued institutional involvement, not only short term support and then stopping.

4.4 Emerging Themes

Theme extraction from the interview analysis, the focus group discussion, and field observation basically turned up three main themes that point to the experiences and coping strategies of community members in Mbire District.

4.4.1 Theme 1: Nutritional gardens as a recovery strategy

Nutritional gardens were mentioned again and again, as if they were lifelines especially during periods of drought and flooding. People seemed to link them not only to quick material relief from hunger, but also to that inner, mental steadiness that comes with having something to rely on. One farmer said “Our garden gave us hope as our fields dried up”, and that kind of testimony backs the idea that community-based programmes can work like an anchor for recovery when environmental conditions get harsh.

4.4.2 Theme 2: Challenges to sustainability

Nevertheless there are some difficulties that threaten the sustainability of the nutritional gardens, even with all the benefits people associate with these programmes. The most obvious issue is lack of water, which is usually soon followed by poor soil conditions and not enough extension services. An extension service officer noted “With no irrigation facilities, gardens fail during droughts,” and this aligns with what Mukwada and Manatsa (2022) argue, that structural constraints and weak institutional backing often restrict rural adaptation initiatives.

4.4.3 Theme 3: Opportunities for Resilience

Community engagement, particularly among women and young people, turned out to be an important aspect that could be used to enhance resilience. “We get together because of the gardens; we learn from one another,” noted one of the youth participants. As stated by Bradshaw & Fordham (2022), participation helps improve adaptation potential.

4.5 Spatial and Environmental Findings

Field observations proved that gardens which were established were closer to boreholes and river banks, where access to water is relatively easier. These areas made it possible for households to irrigate the gardens, thus making them productive even when drought periods occurred. Areas away from water sources had garden sites left barren due to their dependency on water.

The quality of soils was diverse among various sites. Soils like sandy loam soils were common; however, they needed the addition of organic matter like manure and composts to be able to maintain their productivity. Field observation showed that households using mulching and composting techniques produced higher yields than those depending on chemical fertilizers alone.

4.6 Chapter Summary

Nutritional gardens kind of give direct access to food security and also small income generation opportunities , especially during the recovery from those disaster periods in Mbire district. The qualitative findings showed gender specific matters that women have to deal with, and also how important community participation is , plus the way gardens become precarious when droughts show up. The spatial data on the other hand basically indicated that whether the gardens keep going is strongly tied to water availability and also the condition of the soil. So in summary the results point to nutritional gardens as potentially useful recovery methods , but they remain quite vulnerable .

CHAPTER 5: DISCUSSION AND RECOMMENDATIONS

5.1 Introduction

This chapter, discusses the current research results and the recommendations that come with them. More specifically, the outcomes from Chapter four will be examined through theories, and also earlier investigations that talk about climate change resilience and how communities adapt. The point isn't only to lay out what the evidence says, but to work through how those results connect back to the wider global perspectives in this field. After that, the chapter wraps up with a set of practical recommendations, derived from the critical interpretation.

5.2 Summary of Key Findings

It was discovered that nutritional gardens play a important role in giving household food security in Mbire District, because they offer pretty instant help during drought recovery and they also reduce the overdependence on food aid. The study further found that women and vulnerable people were the key players in making sure these gardens still survive, mostly through water supply and seed handling , and also by making sure nutrition is provided. Even if the leadership coming from these groups seemed to increase their overall resilience, it was still evident that this also exposed them to some difficulties. It is clear that for nutritional gardens to keep living in drought prone areas , there has to be access to water sources, good quality seeds, and extension support services. Also the strength behind the survival of these gardens sits in community participation, including women as well as youths . But even with that community involvement , it is important to note that some institutions are not doing enough , in terms of involvement .

5.3 Discussion of Findings in Relation to Literature

Results from the Mbire District validate and contradict existing literature regarding climate resilience and community adaptation strategies. Nutritional gardens have been found to be effective in ensuring food security for households, corroborating findings in the FAO (2021) study which emphasizes the role of gardens in supporting nutrition in times of disasters. The testimonies of participants regarding nutritional gardens as lifesavers during drought periods provide further support for this idea, even as the vulnerability of such gardens to long-term dry periods poses a challenge.

Ecological problems in the form of water shortages appear to be the major challenges for the region, similar to the assertion by Mapfumo and Collinson (2020), who warn against the impact of unsustainable conditions in rural districts in Zimbabwe due to lack of adequate water and extension services. Female-headed households have further reinforced the importance of women involvement in resilience-building activities. Whereas their involvement improved resilience levels, they were subjected to unfair and unreasonable burdens due to the gendered nature of adaptation processes. Participation of communities, especially by women and youths, was in line with the argument by Mugambiwa and Tirivangasi (2017), who highlight the fact that the empowerment of local individuals improves resilience levels.

However, inadequate technical follow-ups by NGOs and governments are an indication of the existing institutional problems, just like what is argued by Mukwada and Manrecovery, gardens have been used to enhance communities' resilience by reducing vulnerability and adapting to harsh weather conditions. However, vulnerability of such efforts in face of prolonged climatic challenges indicates the limitations of community-led programs without any supportive structures in place.

The research highlights the importance of women and young people in keeping up the process of adaptation through various activities. Ecological issues such as limited supply of clean water, degraded soils, and lack of seeds have always been important determinants of adaptation and sustainability of such efforts. In absence of necessary structures and facilities as well as regular extension support, these gardens can fall apart, proving that it is not enough to rely solely on the power of communities to build resilience.

5.5 Recommendations

5.5.1 Policy Recommendations

In the context of national resilience, the following steps may be considered effective: inclusion of climate resilient water harvesting techniques into national development plans for rural areas; expansion of boreholes, implementation of solar irrigation systems, and adoption of rainwater harvesting to ensure that there is no vulnerability to droughts; and creation of local seed banks to facilitate the provision of drought resistant seeds. Nutritional aspects and climate resilience measures could be integrated into the housing and rural development strategies at the national level.

5.5.2 Institutional Recommendations

The organizations like government agencies, NGO's, and extension services need to be more involved in helping community-based activities. The improvement in the functioning of the extension services through proper training and soil fertility management programs can enhance the productivity level of the community members. It is essential that the NGO's stop working on ad-hoc basis and include community voice in their program designs.

5.5.3 Community-Level Recommendations

On a community level , resilience can get better by working up seed banks, strengthening soil fertility management using composting plus mulching, and also boosting the count of women's garden co-operatives. In addition, communities should take part in decision making processes via committee setups that have women, youths, and marginalized people inside them, so they can empower together, not just individually. Community leaders, meanwhile, should push for the exchange of knowledge between individuals, making sure that indigenous practices blend with science, rather than staying separate.

5.5 Suggestions for Further Research

However, there is still room for improvement in terms of what needs to be done for future researchers regarding nutritional gardens in increasing resilience in the district of Mbire. Firstly, it will be important to carry out longitudinal research on the performance of nutritional gardens in different seasons as well as during drought periods. Secondly, there may be a need to carry out comparative studies on how nutritional gardens have performed in other districts like Chivi, Mwenezi or Gutu.

Thirdly, future studies may use geographic information system (GIS) tools to map out areas of resilience or areas of vulnerability. Lastly, interdisciplinary research can be carried out to include aspects such as agro-ecological issues, gender and institutional arrangements.

5.6 Chapter Summary

In this chapter, we have critically analysed the outcomes about the literature, and drawn conclusions on resilience, and vulnerability in Mbire District. Then we went on, with recommendations for action across policy, institution, and community based levels, even if it feels

a bit broader than it should. Further research avenues have also been suggested, too, so as to enlarge knowledge on climate-smart adaptations. From the study, it is quite clear that nutritional gardens improve food security and resilience, however their sustainability depends, on some factors, in a more subtle way than we first assumed.

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RESEARCH INSTRUMENTS

Annexure A: Interview Guide

Interview Guide: The Impacts of Climate Change on Vulnerable Communities: A Case Study of Mbire District, Zimbabwe

Hello, my name is Masimba E. Marowa (Reg. No. B223238B) and I am currently a student at Bindura University of Science Education undertaking Disaster Management Sciences. In relation to Disaster Management Sciences, we are expected to conduct researches on certain topics and our success depends on how committed you are in participating in answering questions in our studies. The topic I intend to explore in my research is: "The Impacts of Climate Change on Vulnerable Communities: A Case Study of Mbire District, Zimbabwe". I wish you could take out some time and answer all the questions that follow. It is important to note that the participation is entirely voluntary. Moreover, your personal data will remain anonymous. No one will be informed about the data collected by me and its purpose is purely academic in nature. Therefore, your participation is very important to me. You have been chosen for me to conduct research among you and thus act as an important key informant.

SECTION A

Demographic Information of Participants

1. How old are you?

Option	**Tick Appropriate Box**
18 – 30 Years	
31 – 45 Years	
46 – 60 Years	
Above 60 Years	

2. What is your highest level of education?

Option	**Tick Appropriate Box**
No Formal Education	
Primary Education	
Secondary Education	

Tertiary Education	

3. Gender Composition

Option	**Tick Appropriate Box**
Male	
Female	

4. What is your position in the community?

Option	**Tick Appropriate Box**
Community Leader / Village Head	
Woman / Female-Headed Household	
Elderly Person (60+)	
Person with Disability	
Youth (18–35 Years)	
Smallholder Farmer	
Agricultural Extension Officer	
NGO / CBO Representative	
Policymaker / Development Practitioner	
Community Member	

5. How long have you been living in Mbire District?

Option	**Tick Appropriate Box**
Less than 5 Years	
5 – 10 Years	
11 – 20 Years	
More than 20 Years	

SECTION B

Perceptions and Awareness of Climate Change

6. How many years of experience do you have in observing or responding to climate-related changes in Mbire District?

Option	Tick Appropriate Box
1 – 5 Years	
6 – 10 Years	
11 – 20 Years	
Above 20 Years	

7. How would you describe the changes in weather patterns in Mbire District over the past 10 to 20 years?

8. In your view, what do you think are the main causes of the climate changes being experienced in Mbire District?

9. How serious do you consider the threat of climate change to be for the vulnerable communities in Mbire District?

Option	Tick Appropriate Box
Not Serious at All	
Somewhat Serious	
Serious	
Very Serious	
Extremely Serious	

10. Which climate-related hazards have had the greatest impact on your community? (Tick all that apply)

Option	Tick Appropriate Box
Drought	
Flooding	

Extreme Heat	
Erratic Rainfall / Crop Failure	
Strong Winds / Storms	
Other (please specify)	

SECTION C

Impacts of Climate Change on Livelihoods and Food Security

11. How has climate change affected farming and livelihood activities in your household or community?

12. Have crop yields changed significantly in recent years as a result of climate change?

Option	Tick Appropriate Box
Yes, yields have significantly decreased	
Yes, yields have somewhat decreased	
No change	
Yields have increased	
I do not know	

13. How has climate change affected your household's access to food and clean water?

14. Has your household experienced food insecurity due to climate-related events such as droughts or floods?

Option	Tick Appropriate Box
Never	
Rarely	
Sometimes	
Often	
Always / Every Season	

15. How has climate change affected income-generating activities in your community? Has migration increased as a result?

SECTION D

Impacts on Vulnerable Groups

16. In what ways do women in this community experience the impacts of climate change differently from men?

17. How has climate change affected the elderly members of your community in terms of their livelihoods and well-being?

18. What specific challenges does climate change pose for youth in Mbire District (e.g., migration, unemployment, education)?

19. How does climate change affect persons with disabilities in this community? What barriers do they face in accessing support?

20. Which group do you consider to be the most vulnerable to climate change impacts in Mbire District? (Tick the most applicable)

Option	**Tick Appropriate Box**
Women / Female-Headed Households	
Elderly Persons	
Youth	
Persons with Disabilities	
Smallholder Farmers	
All of the Above	

SECTION E

Coping and Adaptation Strategies

21. What strategies have you or your household adopted to cope with the effects of climate change in Mbire District?

22. Which of the following adaptation strategies have been used in your community? (Tick all that apply)

Option	Tick Appropriate Box
Changing planting dates or crop varieties	
Water conservation / rainwater harvesting	
Diversification of income sources	
Livestock management adjustments	
Nutritional / community gardening	
Reliance on food aid or remittances	
Migration for employment	
Other (please specify)	

23. What community-level initiatives exist to help residents adapt to climate change in Ward 27, Mbire District?

24. Have agricultural extension officers or NGOs supported any climate adaptation activities in your community? If yes, how effective have these been?

SECTION F

Governance, Policy, and Institutional Support

25. Are you aware of any government policies or programmes designed to help vulnerable communities cope with climate change in Mbire District?

Option	Tick Appropriate Box
Yes, and I have benefited from them	
Yes, but I have not benefited	
I have heard of them but know little about them	
No, I am not aware of any	

26. What roles do local leaders (chiefs, headmen, councillors) play in responding to climate change impacts in your community?

27. How effective is the local government and district administration in responding to climaterelated challenges in Mbire District?

Option	**Tick Appropriate Box**
Very Effective	
Somewhat Effective	
Neutral	
Ineffective	
Very Ineffective	

28. What kind of support does the community need from the government, NGOs, or other stakeholders to strengthen climate resilience for vulnerable groups?

SECTION G

Inclusiveness and Participation in Adaptation Planning

29. Who usually participates in community discussions about climate adaptation in Mbire District (e.g., men, women, elders, and youth)?

30. Do women, youth, elderly persons, and persons with disabilities have equal opportunities to contribute to climate adaptation planning and decision-making?

Option	**Tick Appropriate Box**
Yes, fully included	
Partially included	
Rarely included	
Never included	
I do not know	

31. What barriers exist that might exclude certain vulnerable groups from contributing to adaptation planning or decision-making?

32. How can adaptation strategies become more inclusive for all vulnerable groups in Mbire District?

SECTION H

Reflections and Recommendations

33. In your view, what are the most urgent actions needed to address the impacts of climate change on vulnerable communities in Mbire District?

34. How do you see the situation of vulnerable communities in Mbire District evolving over the next 10 years if current climate trends continue?

35. What recommendations would you make to improve climate resilience for vulnerable groups in Mbire District, drawing on both community experience and external support?

SECTION I

Closing

36. Is there anything else you would like to add about the impacts of climate change on vulnerable communities in Mbire District that we have not yet discussed?

37. Do you have any suggestions on how researchers can work more respectfully and effectively with vulnerable communities on climate change issues?

This marks the end of the interview.
I THANK YOU FOR YOUR VALUABLE TIME AND CONTRIBUTION!

ANNEXURE B Observation Checklist

A. General Community Profile – Mbire District		
Aspect	**Observation Indicators**	**Comments / Notes**
Settlement Patterns	Spatial distribution of homesteads across wards; proximity of dwellings to agricultural fields, rivers (Zambezi, Angwa, Manyame) and water sources; evidence of displacement or relocation linked to floods or drought	
Land Use	Proportion of cropland, communal grazing land, Mopane woodland, dambo/wetland areas and wildlife buffer zones; visible land-use conflicts or encroachment	
Population Vulnerability	Observable indicators: elderly households, female-headed households, child-headed households, households with persons with disabilities; visible food insecurity signs	
Infrastructure	Condition and accessibility of roads (especially during rainy season); presence and functionality of schools, rural health centres, boreholes, irrigation canals, grain storage facilities and markets	

Livelihood Base	Dominant livelihood activities visible (subsistence farming, fishing, small-scale trading, remittances, wildlife-based activities); signs of livelihood diversification or abandonment	

B. Evidence of Indigenous Knowledge in Climate Adaptation

Aspect	Observation Indicators	Comments / Notes
Farming Methods	Use of drought-tolerant/early-maturing traditional crop varieties (e.g., Masvusvu sorghum, rapoko/finger millet); mixed cropping, intercropping, use of organic/kraal manure; staggered planting to manage rainfall uncertainty	
Soil & Water Conservation	Presence of hand-dug contour ridges, tied ridges, conservation furrows, mulching with crop residues; use of dambos for dryseason cultivation; planting of indigenous trees as windbreaks or soil stabilisers	
Livestock Management	Presence of indigenous breeds (Mashona cattle, indigenous goats) tolerant of heat and tsetse; traditional transhumance/seasonal movement patterns; use of indigenous plants for veterinary purposes	

Traditional Weather Forecasting	Community reliance on natural indicators: flowering of Baobab or Mopane, behaviour of quelea birds, appearance of specific insects, wind direction from Zambezi escarpment, moon ring observations; seasonal ceremony timing	
Seed Preservation	Traditional granary structures (deura/gota) for seed and grain storage; community	
	seed-banks or informal seed-exchange networks; criteria used for selecting seed from own harvest	
Energy & Natural Resource Use	Use of indigenous tree species for fuel wood and construction; evidence of resource conservation rules (sacred groves, areas set aside by the chief); use of solar or biogas where present	

C. Observed Indicators of Climate Change Impacts in Mbire

Aspect	Observation Indicators	Comments / Notes
Rainfall Variability	Evidence of late or erratic rainfall onset visible in field conditions; standing water from flash floods vs. cracked dry soils from drought; community-reported failed seasons (assess crop residue in fields)	

Temperature & Heat Stress	Observable signs of heat stress on crops (leaf scorch, premature grain filling); wilting of vegetation during dry spells; reduced shading from tree dieback; community coping with extreme heat	
Water Sources	Drying or reduced flow of seasonal rivers; siltation of dams; lowered borehole water tables; community adaptations — new hand-dug wells, water trucking, increased travel distance to collect water	
Vegetation & Ecosystems	Visible deforestation, encroachment into woodland; changes in Mopane woodland	
	density; invasion by alien species (e.g., Lantana camara); loss of riparian vegetation along Zambezi tributaries	
Soil Degradation	Gully erosion, sheet erosion on slopes and field edges; siltation in low-lying areas; visible decline in soil organic matter; abandoned fields due to infertility	
Flood & Drought Damage	Flood watermarks on structures; washedaway fields or embankments; destroyed or relocated homesteads; signs of recurring drought (sparse vegetation, stunted crops, livestock mortality evidence)	

Food Security Indicators	Visible grain storage levels (full, half or empty granaries); presence of wild food gathering (fruits, roots, caterpillars); signs of out-migration for food; visible malnutrition indicators in children	

D. Inclusiveness of Vulnerable Groups in Adaptation Practices

Aspect	**Observation Indicators**	**Comments / Notes**
Gender Participation	Visible roles of women, men and youth in farming, water collection, conservation activities and community meetings; genderdifferentiated workloads; women's access to land, inputs and information	
Youth Engagement	Youth involvement or absence in traditional farming and natural-resource management; migration of youth away from village;	
	integration of youth in local adaptation committees	
Marginalised Groups	Participation of elderly, persons with disabilities and female-headed households in adaptation activities and resource access; evidence of exclusion or differential vulnerability	

Decision-Making	Observation of who speaks, chairs and makes decisions in village adaptation meetings; inclusiveness of ward development committees (WDCs); women in leadership of adaptation initiatives	
Knowledge Sharing	Platforms observed for transmitting climate adaptation knowledge: dare/indaba discussions, agricultural field days, church gatherings, community radio, school programmes	
Social Support Systems	Evidence of nhimbe (communal labour), zunde ramambo (chief's communal field) or other traditional safety nets; cooperative food sharing or livestock lending during stress periods	

E. Integration of Indigenous and Modern Adaptation Approaches		
Aspect	**Observation Indicators**	**Comments / Notes**
Use of Modern Inputs	Presence of hybrid seed varieties (e.g., SC403, DK8031), chemical fertilisers, agro-chemicals; availability and	
	affordability of inputs at local agro-dealers; government input schemes (Pfumvudza/Intwasa)	

Climate-Smart Agriculture	Evidence of Pfumvudza/Intwasa conservation agriculture plots; minimum tillage, direct seeding basins; mulching combined with modern inputs; water harvesting structures supported by Agritex or NGOs	
Adaptation Projects	Visible infrastructure or activities linked to WFP, FAO, CARE, WWF, Zimbabwe Red Cross, Agritex or ZINWA; signage, demonstration plots, boreholes, solarpowered irrigation, food/cash-for-work programmes	
Blended Practices	Evidence of farmers combining traditional crop varieties with CSA techniques; use of indigenous weather signs alongside mobilephone weather apps or Agritex advisories; both kraal manure and basal fertiliser applied	
Community Acceptance	Level of community participation and ownership in introduced projects; visible maintenance of project infrastructure by community; local champions or volunteer farmers leading adoption	

F. Governance and Institutional Support for Climate Adaptation		
Aspect	**Observation Indicators**	**Comments / Notes**

Traditional Leadership	Role of Chief or headmen in natural resource management; traditional leader participation in adaptation planning; enforcement of community by-laws on land and water use	
By-Laws & Resource Rules	Observable traditional rules governing grazing, firewood cutting, fishing and wetland use; communication of ward bylaws; fines or sanctions for violations	
Local Government Structures	Activity of Mbire Rural District Council (RDC) in adaptation support; ward councillors involvement in WDC meetings; presence of district Agritex, EMA or ZINWA officers	
Collaboration	Observable interaction and coordination between traditional leaders, RDC, Agritex, NGOs and community; joint planning meetings; information flow between district and village level	
Conflict & Resource Competition	Evidence of conflicts over water, grazing land or firewood; tension between farming communities and wildlife management (human-wildlife conflict near Mana Pools buffer zones); land boundary disputes	

G. Overall Reflections on Community Resilience and Vulnerability

Aspect	Observation Indicators	Comments / Notes
Community Resilience	Visible coping and adaptive strategies actively in use; strong social cohesion and communal spirit; community-led resource management; evidence of recovery from previous shocks (Cyclone Idai, 2019–20 drought)	
Key Vulnerabilities Observed	Major barriers to adaptation: resource constraints, remoteness and poor road access, limited extension services, climate information gaps, high dependence on rainfed agriculture, human-wildlife conflict	
Environmental Degradation	Extent of deforestation, soil erosion, water source degradation and biodiversity loss; trajectory worsening, stable or recovering; community awareness of link between degradation and climate vulnerability	
Best Indigenous Practices	Most effective and widely used indigenous strategies observed; practices with strongest community endorsement; strategies with potential for scaling or formal policy recognition	
Researcher Reflections	Positionality notes; surprising or unexpected observations; emerging themes not captured in other sections; gaps requiring follow-up interviews or focus group discussions (FGDs)	

Bindura University of Science Education

DISASTER RISK REDUCTION DEPARTMENT
Private Bag 1020,
Bindura, Zimbabwe
Tel 263 – 66210-7531-6, 7621-4
Fax: 263-66210-7534
E-mail: emavhura@buse.ac.zw or edmavhura@gmail.com
Cell: +263 773 487 211

BINDURA UNIVERSITY OF SCIENCE EDUCATION

01 DECEMBER 2025

To Whom It May Concern:

This is to confirm that **Masimba Erick Marowa,** Registration Number **B223238B** is a student doing a Bachelor of Science Honours Degree in Disaster Management Sciences in the Disaster Risk Reduction Department at Bindura University of Science Education and is required to do a Research Project as part of her Degree programme. The student is expected to gather data for her project from various sources including your institution.

This letter therefore serves to kindly ask you to assist the above-mentioned student with information relating to her project entitled:

THE IMPACTS OF CLIMATE CHANGE ON VULNERABLE COMMUNITIES. A CASE STUDY OF MBIRE DISTRICT.

Thank you.

CHIEF EXECUTIVE OFFICER
MBIRE RURAL DISTRICT COUNCIL
01 DEC 2025
MBIRE

EMMANUEL MAVHURA (PhD)
CHAIRMAN

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