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INTERROGATING HOUSEHOLD RESILIENCE TO CLIMATE CHANGE THROUGH LIVELIHOOD DIVERSIFICATION IN MAKOTAMO & DIRIKWE VILLAGES IN WARD 8, CHIMANIMANI DISTRICT, ZIMBABWE

BY

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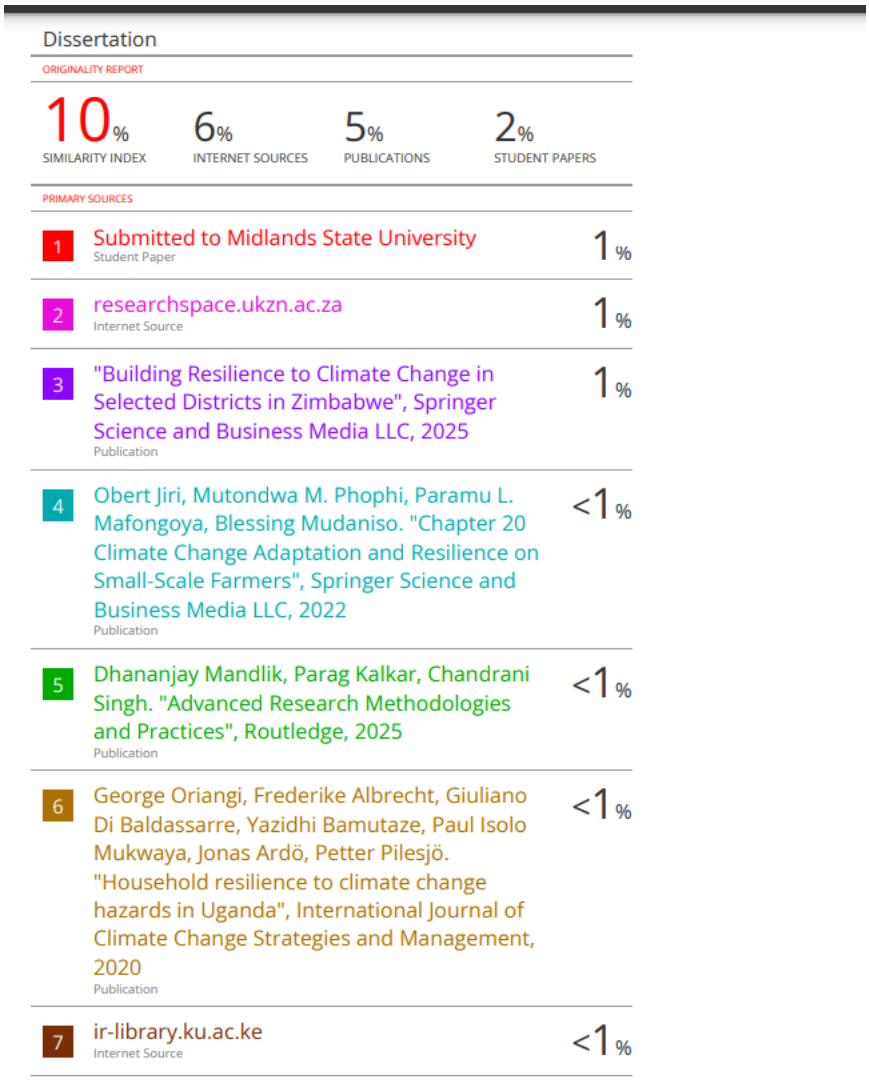

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The undersigned certifies that has read this project and approved its submission for marking after confirming that it conforms to the department requirements.

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I, Munyaradzi Kurumwa (B1748917) declare that this project is my own and has not been copied or lifted from any source without acknowledgement of the source.

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DEDICATION

To my father (the late Mr. Kurumwa), my mother Mrs. M Kurumwa, my siblings and my loving husband.

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ABSTRACT

Most Zimbabwean rural communities, for instance, Makotamo and Dirikwe villages in Ward 8, Nyanyadzi, Chimanimani District, encounter escalating hurdles from climate change, associated with high temperatures and low rainfall, greatly impacting livelihoods mainly based on agriculture and small businesses. This study explores the role of livelihood diversification in enhancing household resilience to different climate-related perturbations in this vulnerable community. A mixed-methods research approach was employed, exploring existing livelihood strategies, assessing the impact of livelihood diversification on household resilience, and determining factors influencing livelihood diversification adoption. The findings from this research aim to contribute to the development of strategies and policies that enhance the strength of rural communities in Ward 8, Nyanyadzi, and comparable communities facing the adverse impacts of a changing climate.

LIST OF ACRONYMS AND ABBREVIATIONS

AGRITEX…….Agricultural Technical and Extension Services

BEAM……...Basic Education Assistance Module

CBOs…….Community-Based Organizations

CSA……...Climate Smart Agriculture

FAO……...Food and Agriculture Organization

FGD……...Focus Group Discussion

HLR……...Household Livelihood Resilience

IPCC……..Intergovernmental Panel on Climate Change

KII…….Key Informant Interview

NGO……..Non-Governmental Organizations

SADC……Southern African Development Community

SMEDCO……..Small and Medium Enterprises Development Corporation

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CHAPTER ONE INTRODUCTION

1.1 Introduction

Most rural communities in Zimbabwe are encountering growing challenges due to the intensifying impacts of the changing climate (Chingombe & Musarandega, 2021). Among them, Makotamo and Dirikwe villages in Ward 8 of Nyanyadzi, Chimanimani District exhibit great vulnerability to climate-induced perturbations. This community struggles with extremely high temperatures and low rainfall, receiving an average of 150 millimeters annually, negatively affecting household livelihoods (Nhamo & Chikodzi, 2021). The primary livelihood activities in these villages encompass crop production, livestock rearing, small businesses, and casual labor that are being directly threatened by climate-related shocks and disasters. Hence, many households suffer as they fail to acquire basic needs such as food, shelter, education, healthcare, and the condition is often exacerbated by the recurring hunger experienced over many consecutive years. The far-reaching effects of this situation worsen poverty and food insecurity, requiring an urgent need for effective strategies to enhance household resilience. Hence, the finding of this research aims to contribute to addressing the existing knowledge gap on the livelihood diversification options in Ward 8, Nyanyadzi, and explore the role of diversified livelihoods in promoting household resilience to climate change. Accordingly, this study will guide the development of effective strategies to enhance the resilience of the livelihoods of this vulnerable community through examining current livelihood diversification strategies and the factors that affect the adoption of livelihood diversification.

1.2 Background of the Research

Globally, the accelerating impacts of climate change are increasingly eroding the resilience of rural households, who heavily rely on climate-sensitive livelihoods like agriculture (IPCC, 2022). This is observed through increased occurrence and intensity of extreme weather events, such as droughts and floods, directly destroying livelihoods and infrastructure. Consequently, these climate-induced disasters and shocks exacerbate poverty and food insecurity (FAO, 2013). In Southern Africa, climate change is worsening the already existing vulnerabilities and creating new challenges. The region is also experiencing increased incidence and intensity of extreme weather events like droughts, floods, and cyclones, which directly impact livelihoods, mostly those dependent on rain-fed agriculture (IPCC, 2022). In Zimbabwe, recurring droughts have led to extensive crop failures and livestock losses, heightening poverty, food insecurity and malnutrition among rural communities (Dube & Ncube, 2022). Likewise, Malawi has also experienced severe weather shocks that reduce household consumption and push more people into poverty (World Bank, 2025).

In Mozambique, communities face countless cyclones and floods that destroy infrastructure, displace populations and claim lives, and disrupt agricultural activities, ultimately straining household resources. Climate change greatly affects rural communities in Zimbabwe. Chimanimani District is an affected district, as cited by Chingombe & Musarandega (2021). Makotamo and Dirikwe villages in Ward 8, Nyanyadzi, are prone to climate-induced shocks, characterized by high temperatures and low rainfall being received of approximately 150 millimetres, which greatly affect household livelihoods (Nhamo & Chikodzi, 2021). Dominant livelihood activities comprise crop production, petty businesses, livestock rearing, and casual labour. Most households are very vulnerable to the stresses, struggling to acquire basic needs like food, healthcare, education, and shelter. This is mainly triggered by the frequent hunger experienced for 3-5 consecutive years. Thus, the effects of these events are far-reaching, worsening poverty and food insecurity, indicating the necessity for effective measures to enhance household resilience. Hence, this study intends to contribute information to address the knowledge gap in line with livelihood diversification options in Ward 8, Nyanyadzi, and its contribution to household resilience to climate change, among other shocks experienced in the area. Through the examination of the current livelihood diversification options as well as factors influencing livelihood diversification options, this research seeks to contribute to the development of effective strategies for enhancing household resilience in this vulnerable community.

1.3 Statement of the Problem

According to Chingombe & Musarandega (2021), climate change is increasingly affecting rural communities in Zimbabwe, particularly in the Chimanimani district. Ward 8, Nyanyadzi, is very prone to climate-related disasters and shocks, including droughts, floods, tropical cyclones, and heat waves, which exacerbate poverty and food insecurity among households. Climate change results in poor agricultural yields and reduced livestock productivity, causing loss of income and livelihoods in this community. Increased occurrence of droughts affects both food availability and accessibility, thereby escalating food insecurity and malnutrition, school dropouts, unwanted pregnancy and early marriage, domestic violence, and gender-based violence. Despite the potential of livelihood diversification to enhance household resilience in the area under study, its effectiveness in this context is not well understood (Chingombe & Musarandega, 2021). Accordingly, the study aims to interrogate the intricate relationships among climate change, livelihood diversification, and household resilience in Makotamo and Dirikwe villages, Ward 8, Nyanyadzi. Therefore, the research seeks to explore households' resilience to climate change and

assess the effectiveness of livelihood diversification in building resilience, ultimately contributing to the existing body of knowledge on household resilience to climate change**.**

1.4 Main Aim of the research

To interrogate the effectiveness of livelihood diversification in enhancing household resilience to climate-related shocks and stresses in Makotamo and Dirikwe Villages, Ward 8, Nyanyadzi.

1.5 Objectives of the study.

- To explore households' livelihood options in Makotamo and Dirikwe Village, Nyanyadzi Ward 8
- To assess the effectiveness of different livelihood strategies in enhancing household resilience to climate change in Makotamo and Dirikwe, Nyanyadzi Ward 8.
- To investigate the factors that influence the adoption of livelihood diversification strategies by households in Ward 8, Nyanyadzi.

1.6 Research questions

1. What are the current livelihood strategies employed by households in Makotamo and Dirikwe villages, Ward 8, Nyanyadzi?
2. How does livelihood diversification impact household resilience to climate change in Makotamo and Dirikwe villages in Ward 8, Nyanyadzi?
3. What factors influence the adoption of livelihood diversification strategies by households in Makotamo and Dirikwe villages, Ward 8, Nyanyadzi?

1.7 Justification or significance of the study

The study on interrogating household resilience to climate change through livelihood diversification in Makotamo and Dirikwe Village of Ward 8, Nyanyadzi, Chimanimani is significant because climate change is a pressing global issue, with a devastating impact. Chikodzi et al. (2024) extrapolated that the Chimanimani District is vulnerable to climate-related disasters, including droughts, floods, and heat waves, which have severe consequences on household livelihoods. As a result, urgent attention is required to address the alarming vulnerability of rural households in Ward 8, Nyanyadzi, Chimanimani, to climate-related disasters. Quandt (2018) supported that livelihood diversification is one of the key strategies for promoting household resilience to climate change. The involvement of households in multiple income-generating activities reduces their reliance on a single source of income, thereby spreading the risk of loss and increasing disposable income.

As cited in the research on climate resilience strategies and livelihood patterns in dry regions of Zimbabwe that was conducted by Chitongo (2021), there is inadequate research on the usefulness of livelihood diversification in supporting household resilience to climate change in Ward 8, Nyanyadzi, Chimanimani. In this context, there is a paucity of literature and inadequate research done on how household resilience to climate change is enhanced by livelihood diversification (Chingombe & Musarandega, 2021). Accordingly, this study is justified as it seeks to provide valuable insights into the effectiveness of livelihood diversification in strengthening household resilience to climate change. The study is also significant because of its focus on a specific context, Makotamo and Dirikwe village of Ward 8, Nyanyadzi Chimanimani, a rural area highly susceptible to climate-related shocks, contributing towards the development of effective policies and programs that promote household resilience to climate change and any other shocks that affect communities. This includes the development of policies that support climate change adaptation and mitigation efforts in the community and the country at large. Hence, the study's findings can inform the design of interventions that support livelihood diversification, thereby enhancing household resilience to climate change, mostly in rural areas. Eventually, the study would contribute to the improvement of livelihoods and well-being of households in Makotamo and Dirikwe villages of Ward 8, Nyanyadzi Chimanimani, and other areas with similar contexts in the face of climate change.

1.8 Research validity and reliability

The validity and reliability of the research are crucial to ensure the accuracy, trustworthiness, and generalization of results. To achieve this, the researcher employed various strategies during the data collection and the data analysis process. Bausman & Halina (2018) emphasized that one way of ensuring the validity of the data collection instruments is through conducting a pre-test survey for the questionnaire, focus group discussion (FGD) guide and Key Informant Interview (KII) guides. In this research, a pilot study was done, administering the data collection instruments to a small sample of 4 households and 1 stakeholder in Makotamo and Dirikwe village, Ward 8, Nyanyadzi, Chimanimani. The feedback from the pilot study was used to refine and revise the data collection instruments to ensure that they are valid and reliable. More so, to ensure the dependability of the data collection tools, the researcher used quantitative and qualitative data collection methods. The questionnaire was designed to collect mostly quantitative data, whilst the FGD and KIIs collected qualitative data. The use of multiple data collection methods helped to triangulate the data and increase the reliability of the findings.

1.9 Assumptions

The researcher anticipated that the information provided by the respondents in Makotamo and Dirikwe villages, Ward 8, Nyanyadzi, is truthful and accurately reflects their experiences and perceptions regarding

climate change impacts and livelihood strategies. Furthermore, it is assumed that the participants understand the climate-related challenges affecting their livelihoods and the various income-generating activities they engage in. The study also assumes that the chosen research methods, including surveys, FGDs, and KIIs, are appropriate tools for gathering relevant data and capturing the nuances of household resilience and livelihood diversification in this specific context. Finally, it is presupposed that the prevailing socio-economic and environmental conditions in the study area remained relatively stable during the data collection period, allowing for a meaningful analysis of the relationships between climate change, livelihood diversification, and household resilience.

1.10. Limitations of the research

One of the limitations of this study is its reliance on self-reported data from households. The questionnaire and FGDs depend on household members' perceptions, views and experiences on climate change and livelihood diversification. While self-reported data can provide valuable insights into household experiences, it may also be subject to biases and errors, for instance, household members may exaggerate or underestimate the role of livelihood diversification in enhancing household resilience in the face of climate change. Another limitation of this study is its focus on only one ward, Ward 8, Nyanyadzi Chimanimani. Although this focus allows for an in-depth investigation of household resilience to climate change in a particular context, it may not be representative of other wards or districts in the country. Thus, the findings of the study may not be generalizable to other contexts, requiring further study to confirm their validity. Overall, the limitations of the study highlight the need for further research on household resilience to climate change through livelihood diversification in Ward 8, Nyanyadzi, and Chimanimani.

1.11 Definition of key terms

Climate Change

Gezie (2019) defined climate change as a shift in the state of the climate that can be identified, for example, using statistical tests, and the change persists for an extended period, usually decades or longer. Climate change includes any significant alteration in climate measures, such as temperature, precipitation, or wind, which lasts for an extended period (decades or longer).

Household resilience

The IPCC (2014) refers to resilience as the ability of a system and its parts to participate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including by ensuring the preservation, restoration, or improvement of its essential basic structures and functions.

Building resilience involves reducing vulnerabilities, as there is a negative correlation between the two. Rose (2017) stipulated five major dimensions of resilience, encompassing social, economic, environmental, psychological, physical, and institutional resilience. In an attempt to analyze resilience, both ex-ante actions that reduce continual risk and ex-post actions that help individuals' households and communities after a disaster occurs must be considered (Marchant & Stevens, 2017). This promotes the most effective combination of short-term and long-term strategies for building adaptive capacity and resilience, moving communities out of the traps of abject poverty, both food and nutritional insecurity.

Béné et al. (2015) emphasized that resilience refers to the capacity of an individual, household, or community that is exposed to hazards to fight, accommodate, and recuperate in a timely and efficient way, and the ability to adapt or modify its essential basic structures and functions. Thus, this study refers to resilience as the capability of individuals, communities, or systems to resist, adjust, and recover from adverse situations, challenges, or disasters. This involves being able to absorb and handle stress, change, or uncertainty, and bounce back better.

1.12 Research Gap

While existing literature outlines common livelihood options in rural areas globally, within Southern Africa, and specifically in Zimbabwe, in Chimanimani District, a notable research gap exists concerning the nuanced understanding of the specific array of livelihood options available to households in the particularly vulnerable context of Makotamo and Dirikwe villages in Ward 8, Nyanyadzi (Liu & Fang, 2021; Moyo, 2016). Although studies acknowledge the prevalence of agriculture (crop production and livestock rearing) alongside off-farm activities (trading, crafts, services) and remittances in the broader Chimanimani area (Mabeza, 2016), there is a lack of in-depth investigation into the precise composition and relative importance of these diverse strategies at the micro-level of these specific villages. The extent to which non-agricultural activities like craft production and food processing are adopted and their actual contribution to household income in Makotamo and Dirikwe remains underexplored (Celio et al., 2023). Similarly, the role and magnitude of remittances and the effectiveness of social safety net programs in the specific context of these climate-vulnerable villages require further scrutiny (Wamalwa, 2020; Mutasa, 2015). The understanding of the specific livelihood options employed by households in Makotamo and Dirikwe, beyond the general trends observed in the wider district, is crucial for tailoring effective resilience-building interventions. Therefore, this study aims to address this gap by providing a

detailed exploration of the current livelihood strategies employed by households within these two villages.

1.13 Organization of the study

This research is presented in five chapters, as follows: Chapter One, general introduction of the study. Chapter two comprises of literature review and the theoretical framework of the study. Chapter three is devoted to the research methodology and research designs adopted for the study. The research results are presented in chapter four, and the whole study will be summed up in this chapter. Chapter five focuses on the summary of the study, key conclusions, and recommendations.

1.14 Chapter summary

This chapter outlines the study overview on investigating the effectiveness of livelihood diversification in enhancing household resilience to climate change in the vulnerable rural communities of Makotamo and Dirikwe villages, Ward 8, Nyanyadzi, Chimanimani district, Zimbabwe. The area is experiencing different climate-induced shocks that exacerbate poverty and food insecurity by threatening primary livelihoods such as agriculture and small businesses. The research employs a mixed-methods design, collecting both quantitative and qualitative data to explore current livelihood options, assess the impact of diversification on resilience, and identify factors influencing its adoption, ultimately aiming to inform strategies that strengthen the resilience of these communities, guided by the household livelihood resilience (HLR) framework.

CHAPTER TWO LITERATURE REVIEW

2.1 Introduction

This chapter reviews the existing literature on household resilience to climate change through livelihood diversification. The issue of climate change is topical, negatively affecting households' livelihoods and wellbeing, so it requires urgent attention to attain the Sustainable Development Goals by 2030. To enhance household resilience to climate change, different strategies need to be put in place. Accordingly, the HLR approach was used to clearly understand the topic as the framework emphasizes the importance of livelihood diversification in reducing vulnerability while increasing resilience. Owing to the paucity of information and inadequate practical research done on the topic at hand, this study would provide additional information on different livelihood diversification strategies, factors that affect diversification, as well as the role of livelihood diversification in reducing climate change vulnerability and increasing household resilience.

2.2 Theoretical framework

The study was informed by the HLR framework as it is aligned with the research objectives. According to Kwan (2018), the HLR framework specifically examines household resilience, aligning with the research topic focusing on interrogating household resilience to climate change. Pelletier et al. (2016) indicated that the HLR framework is a crucial tool for understanding how households adapt and thrive in the face of various challenges like climate change, economic shocks and cultural shifts. It measures a household's capacity to maintain and improve its livelihood opportunities even when facing environmental shocks like climate change.

Livelihood diversification is a key strategy to achieve household resilience by spreading risks across different activities. This involves engaging in multiple income sources, which can lessen a household's dependence on a single climate-sensitive activity, providing a buffer against negative impacts like crop failure due to drought. The framework emphasizes the importance of diverse livelihood strategies, capital assets, and social networks in enhancing resilience. Livelihood capital, which includes social, human, natural, physical, and financial assets, plays a vital role in resilience (Quandt, 2018). Households with strong human and financial capital are better equipped to navigate challenges. As an example, households with access to education, skills, and financial resources can adapt more easily to changing economic conditions and recover more quickly from shocks.

Cultural adaptability is another critical factor that influences resilience, particularly in areas depending mostly on off-farm activities like tourism. Cultural factors and policy awareness can enhance household stability, while households engaged in multiple sectors, including tourism, demonstrate greater resilience compared to those reliant on a single income source. Brabec & Chilton (2015) cited that households that can leverage their cultural heritage and traditional practices can develop innovative solutions to economic and environmental challenges like climate change. Thus, cultural factors can shape a household's ability to adapt to changing circumstances and respond to crises. Social networks also play a vital role in household livelihood resilience. Trust and social networks are essential for resilience, especially during shocks and disasters (Cassidy & Barnes, 2012). Therefore, understanding the complex relationships between social networks, cultural adaptability, and livelihood capital is crucial for developing effective strategies to enhance household livelihood resilience (Hussien & Kulmie, 2024). Accordingly, HRF is relevant for this study as it provides a structured approach to understanding how households adapt and respond to climate-related shocks, allowing a nuanced analysis of the complex interaction between household livelihoods and climate resilience.

2.3 Overview of livelihood options among rural households globally and in the Southern African Region

Globally, rural household livelihoods often involve a mix of agricultural and non-agricultural activities (Liu & Fang, 2021). Livelihood options play a central role in rural areas by providing trails out of poverty and enhancing community well-being. Agricultural activities like crop production and livestock rearing remain prominent, predominantly in developing countries. Moyo (2016) stated that off-farm activities, including trading, crafts, and services, are also imperative, providing differentiated income sources and reducing dependence on agriculture. Wage employment, both within and outside rural areas, and remittances from household members working elsewhere contribute significantly to household incomes at a global scale. In Southern Africa, similar patterns exist, with agriculture playing a central role in rural livelihoods. Off-farm activities are also widespread, often related to tourism, mining, or cross-border trade. Remittances play a great role in some developing countries, particularly those with high levels of labour migration.

2.3.1 Livelihood options among rural households in Zimbabwe

Mabeza (2016) cited that in Zimbabwe, agriculture remains a keystone of rural livelihoods, with maize production being particularly important. Musarandega et al. (2020) added that in Chimanimani District, the

specific livelihood strategies employed by most households are agricultural activities that include crop production and livestock rearing. Off-farm activities, such as trading, crafting, and services, are also important, providing alternative income sources. Other households also rely on remittances from working in the district or a foreign country. Non-agricultural activities like small-scale enterprises and remittances play a great role in supporting household income and food security. Households that engage in small businesses like craft production, tourism, and food processing benefit from better income and reduced reliance on rain-fed farming.

Wamalwa (2020) stated that remittances from household members working either in urban areas or other countries provide a critical source of income to support household livelihoods. Hence, these funds can provide households with alternate means of earning income, reducing those livelihoods that are directly affected by climate change. Also, social safety net programs, like cash and food assistance, are very important to enhance household resilience in the face of the changing climate. Wamalwa (2020) added that social safety programs can provide households with financial support and access to food, which can help to reduce their vulnerability to climate-related shocks. According to Nkonya et al. (2023), households that receive cash and food assistance are more likely to achieve food security and improved livelihoods during and in the aftermath of a disaster.

Nevertheless, there are also limitations associated with the adoption of off-farm livelihood activities, for example, households face problems in accessing markets, technology, and other financial resources that are necessary for the success of such activities (Moyo, 2016). Additionally, households face challenges in handling the risks associated with implementing off-farm activities, including market fluctuations and climate-related shocks. In Zimbabwe, the government has established initiatives to support small-scale businesses, for example, the Small and Medium Enterprises Development Corporation (SMEDCO), which supports households with finance and training for small-scale business owners (Munyawarara, 2019). In addition, the Zimbabwean government is implementing social protection initiatives, like the Basic Education Assistance Module (BEAM) which provides monetary support to vulnerable pupils so that they can access education (Mutasa, 2015). These initiatives help to reduce poverty among pupils. NGOs and some community-based organizations (CBOs) play a crucial role in enhancing off-farm options for improved household resilience to climate change, for example, World Vision is implementing programs to support small-scale businesses and providing social safety nets to vulnerable households. Generally, the adoption of off-farm activities like small-scale businesses and social safety nets is important in enhancing household resilience to climate change. These strategies help households to adapt to climate-related shocks thereby achieving food security and improved wellbeing.

More so, craft production is another non-agricultural activity that can provide households with an income generation yet is not directly dependent on agricultural productivity (Celio et al., 2023). These activities include weaving, pottery, and woodcarving. In addition, food processing also provides households with a source of income that is connected to agricultural productivity but is less susceptible to climate-related shocks. Such food processing activities include jam-making, baking, and brewing. The benefits of those small-scale businesses are numerous, for instance, these initiatives can provide households with a stable source of income, helping to improve household food security and overall livelihoods (Wamalwa, 2020). In this regard, these activities empower households and promote household resilience to climate change.

While existing literature broadly outlines the common livelihood options in rural settings globally, within Southern Africa, and specifically in Zimbabwe's Chimanimani District (Liu & Fang, 2021; Moyo, 2016; Musarandega et al., 2020), a notable research gap exists concerning the nuanced understanding of the specific array of livelihood options available to households in the particularly vulnerable context of Makotamo and Dirikwe villages in Ward 8, Nyanyadzi. Although studies acknowledge the prevalence of agriculture (crop production and livestock rearing) alongside off-farm activities (trading, crafts, services) and remittances in the broader Chimanimani area (Mabeza, 2016), there is a lack of in-depth investigation into the precise composition and relative importance of these diverse strategies at the micro-level of these specific villages. For instance, the extent to which non-agricultural activities like craft production and food processing (Celio et al., 2023) are adopted and their actual contribution to household income in Makotamo and Dirikwe remains underexplored. Similarly, the role and magnitude of remittances and the effectiveness of social safety net programs in the specific context of these climate-vulnerable villages require further scrutiny (Wamalwa, 2020; Nkonya et al., 2023; Mutasa, 2015). The understanding of the specific livelihood options employed by households in Makotamo and Dirikwe, beyond the general trends observed in the wider district, is crucial for tailoring effective resilience-building interventions. Therefore, this study aims to address this gap by providing a detailed exploration of the current livelihood strategies employed by households within these two villages.

2.4 Livelihood diversification to enhance household resilience to climate change

Livelihood diversification has a profound impact on different dimensions of resilience. Cochrane & Cafer (2018) pinpointed that engaging in multiple income-generating options enables households to lessen their reliance on a single source of income, thereby increasing their economic resilience. This diversification enables households to cope with climate-related shocks, such as droughts or floods that may affect one livelihood activity but not others. As an example, a household that combines farming with livestock keeping and off-farm employment can be in a better position to withstand crop failure due to drought. Livelihood

diversification also enhances social resilience by increasing social networks and relationships, for instance, a household that participates in a programme can build relationships with other members, thereby establishing social bonds and support systems. Additionally, diversification can improve access to information, credit, and other important resources, thereby enhancing social resilience. In terms of environmental resilience, livelihood diversification can promote sustainable natural resource management. Sobola et al. (2015) stated that activities that conserve natural resources, such as agroforestry or conservation agriculture, imply that households can reduce their environmental footprint and improve ecosystem services. In turn, this enhances household resilience to environmental shocks, such as landslides or water scarcity.

Physical resilience is also enhanced through livelihood diversification, for example, when households capitalize on multiple assets, such as livestock and equipment, households can reduce their vulnerability to physical shocks, such as damage to homes or structures (Celio et al., 2023). Moreover, diversification can improve access to needs, such as healthcare and sanitation, essential for physical well-being. Quandt (2018) indicated that household involvement in diverse livelihood activities enables the development of household skills, knowledge, and adaptability, which are very critical for coping with uncertainty and change. Additionally, diversification can reduce stress and anxiety, as households are less reliant on a single income source. Finally, livelihood diversification can strengthen institutional resilience by stimulating partnership and coordination among different stakeholders (Tinarwo et al., 2018). Thus, a household that participates in a community-based livelihood program(s) can work with different local authorities, NGOs, and other stakeholders to promote better access to resources, services, and support. This can help build trust, collaboration, and collective action, vital for institutional resilience.

Diversified livelihood options increase income stability, reduce vulnerability to shocks related to climate change or economic depressions, and strengthen individuals and communities to take control of their development. Serrat (2017) noted that increasing livelihood opportunities can enable communities to improve their access to essential amenities, like education, health, and infrastructure, leading to a better quality of life and development at large. At the household level, common coping mechanisms comprise selling assets like livestock or land to earn income for immediate needs such as food and basic health services (Paumgarten et al., 2020). Reducing consumption is another coping strategy, where households cut back on non-basic items and allocate limited resources to urgent needs. However, these temporary strategies can have long-term outcomes, such as reduced livelihood resilience and increased vulnerability.

In Southern Africa, rural households face unique challenges in diversifying livelihoods, including rampant poverty, inequality, and climate variability. To counter these challenges, households in the region mostly

rely on subsistence farming, livestock production, and petty trading. Some households are also involved in migrant labor, with household members travelling to towns or neighboring nations in search of greener pastures. Regional initiatives, such as the Southern African Development Community (SADC)'s Agricultural Development Program, are very important in promoting livelihood enhancement as this aims to promote agricultural productivity, trade, and collaboration among member states (Quinn et al, 2020). In Zimbabwe, households have developed different livelihood strategies to cope with economic challenges, climate change, and other challenges. Many households depend on subsistence farming, producing crops such as maize, cotton, and tobacco. Other households are engaged in livestock production, such as cattle, goats, and chickens. To complement their returns, households also carry out off-farm activities, such as artisanal mining and tourism. Musarandega et al. (2020) elucidated that in Chimanimani, households have started unique coping strategies to deal with climate-related challenges like drought. One such approach employed includes the growing of drought-tolerant crop varieties like sorghum and cowpeas, which are suitable for the local climate. Locally, initiatives such as income-saving and lending schemes also play a great role in stimulating livelihood resilience and adaptation in Chimanimani.

Community-led water harvesting initiatives are a key adaptation measure in Chimanimani. Some smallholder farmers have come together to construct water harvesting structures, such as swales and infiltration pits, mainly for the harvesting of rainwater for irrigation and other domestic uses. This activity has not only promoted access to water but also reduced the workload on women and children, who mostly bear the responsibility of travelling long distances to fetch water. Harvesting and storing rainwater enable farmers to irrigate their crops, even during the dry season, improving production in agriculture and attaining food security (Safari et al., 2020). Soil conservation strategies are another important adaptation strategy in Chimanimani. Community members have implemented different soil conservation measures, including terracing and using contours, as a way to reduce soil erosion and enhance soil fertility. These measures can help reduce soil loss and improve soil fertility for increased crop yields. Therefore, conserving soil health and water enables farmers to maintain agricultural production, reduce soil erosion, and promote ecosystem services.

Another way of enhancing the livelihoods of farmers is through the promotion of climate-smart agriculture (CSA), involving soil and water conservation techniques, crop rotation and agroforestry to promote agricultural production and resilience. Agroforestry is the integration of trees into farming systems to enhance soil health, biodiversity conservation, and ecosystem services (Ghale et al. 2022). Conservation agriculture as part of CSA involves minimum soil tillage, maintaining soil structure, and practising crop rotations for improved soil fertility and reducing erosion (Muzorewa & Chitakira, 2022). Such practices have led to improved crop yields, reduction of soil degradation, and promotion of ecosystem services.

The significance of diversification of livelihoods has been emphasized by different international organizations, such as the United Nations Framework Convention on Climate Change (Celio et al., 2023). Households that have different livelihoods are resilient to various climate-related disasters, and they are mostly food secure with improved livelihoods. Wamalwa (2020) stipulated that households that diversify their livelihoods through off-farm activities like small-scale business and remittances are more likely to achieve food security and improved livelihoods despite different climate-related shocks and challenges. Come (2024) stressed that households in South Africa have opted to engage in tourism-related activities, whilst in Mozambique, households are involved in fisheries. These diversification activities have assisted communities in different countries in improving resilience to climate change. Thus, households that diversify livelihoods can reduce poverty and be food secure, with improved well-being. Chingarande et al. (2020) indicated that in Zimbabwe, Masvingo Province, households diversify into horticulture, small-scale mining, livestock farming, as well as craft production. These measures have contributed towards resilience building to climate change in the country. In Chimanimani district, livelihood diversification is proving to be an effective strategy in enhancing income and food security despite climate change. Households that are engaged in different livelihood activities such as conservation agriculture, livestock production, and off-farm activities better adapt to these disasters and shocks and attain food security and improved livelihoods (Eze et al., 2018). Hence, engagement in several income-generating activities enables households not to depend on a single income source, better adapt to climate-related shocks and disasters, and attain food security and improved livelihoods.

In Zimbabwe, communities in rural areas are adopting these activities as a way to diversify their income-generating streams and reduce their dependence on rain-fed agriculture. To be specific, in the Chimanimani district, many households are engaging in craft making, like weaving and pottery, as an income-generating activity that also improves livelihoods. Conclusively, non-agricultural livelihood activities, including small-scale businesses and social safety nets are important in enhancing household resilience to climate change in Zimbabwe. These initiatives provide households with alternate sources of income and access to food and finance, thereby reducing communities' vulnerability to climate-related shocks. Non-agricultural livelihood activities offer many benefits for households, including reduced reliance on rain-fed agriculture, improved income and food security, enhanced resilience to climate-related shocks, and overall improved livelihoods and well-being (Muza, 2018). However, limited access to finances and technical support, markets and technology, and policy support affect the adoption of non-agricultural activities.

2.5 Factors that influence the adoption of livelihood diversification strategies by households in Makotamo and Dirikwe Villages

2.5.1 Socio-Economic Factors

Socioeconomic factors play a critical role in promoting livelihood diversification. Household income is a vital factor; households earning higher incomes adopt differentiated livelihood options, like investing in off-farm activities and purchasing irrigation equipment (Sun et al., 2023). This implies that there are different income-generating activities, thereby enhancing income for the household. Another socio-economic factor in determining livelihood diversification is the level of education. Educated people have better access to resources and information that can assist them in diversifying their livelihood options (Mutasa, 2015). Also, occupation is an important factor; households with members involved in off-farm activities, like teaching and healthcare, are most likely to have a steady income stream and can start other different livelihood strategies.

2.5.2 Access to credit and financial services

Access to financial services like credit is vital in promoting livelihood diversification among households, especially in rural areas where households mostly face challenges in acquiring financial services that include credit, savings, and insurance products (Moyo, 2016). Accordingly, those households struggle to invest in diversified livelihood options like irrigation, livestock production and other off-farm activities. In Zimbabwe, accessing credit and other financial services is a challenge for many households, mostly in rural areas. So, many people rely on informal financial services, like moneylenders or income-saving and lending initiatives, and at times, they also charge high interest rates. Few microfinance institutions are operating in Chimanimani, providing small loans to households that can enable them to start small businesses. Finally, poor access to financial services like loans makes it difficult for households to diversify their livelihoods, so there is a need for strategies to enhance access to such services so that rural people can access such financial institutions without hindrance. This can enable households to invest in various livelihood options, thereby enhancing their resilience to climate change.

2.6 Knowledge gap

Despite the recognition of livelihood diversification as a crucial strategy for enhancing household resilience to climate change in rural Zimbabwe, a notable research gap exists concerning the specific factors that drive or hinder the adoption of diverse livelihood strategies within the context of Makotamo and Dirikwe of Ward 8, Nyanyadzi (Quandt, 2018). According to Sun et al. (2023), while existing literature broadly acknowledges the influence of socio-economic factors such as income, education, and occupation, the importance of access to credit and financial services, there is a paucity of information in understanding of

how these factors interact and specifically manifest within the unique vulnerabilities and opportunities present in Makotamo and Dirikwe villages. While Sun et al. (2023) highlight the positive correlation between higher income and livelihood diversification, the types of diversified activities adopted by households in these particular villages remain unexplored. Therefore, this study aims to address this gap by specifically investigating the interplay of socio-economic factors and access to financial resources in shaping the adoption of diverse livelihood strategies by households in Makotamo and Dirikwe villages, providing context-specific insights that can inform targeted interventions to promote resilience.

2.7 Chapter Summary

The chapter provided a synopsis of the literature related to livelihood diversification, household resilience and climate change. The chapter also looked at the HLR framework, which is related to the study and helped to explain and respond to the research questions as presented in the above discussion. The next chapter will focus on the research design and methodology.

CHAPTER THREE RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the data collection methods used to attain the research objectives. The chapter also delves into the research design, the data collection tools used, the target population, the research approach and the sampling design of the study. Lastly, the data presentation and analysis procedures were also presented in this chapter.

3.2 Research Design

Churchill et al. (2018) defined research design as the overall plan guiding the researcher during the data collection. It can be quantitative, qualitative or mixed-methods. Accordingly, this study used a mixed-methods approach, where both quantitative and qualitative data collection and analysis methods were combined. Ziervogel et al. (2017) stated that the combination of both quantitative and qualitative methods promotes a better understanding of household resilience to the changing climate since it captures the breadth and depth of livelihood diversification options and their impact on resilience. Also, the mixed approach enables the researcher to validate results, explore the context and meaning, thereby informing the policy and practice (Turner et al., 2017). So, the researcher used mixed methods to ensure a detailed understanding of household resilience to climate change in Ward 8, Nyanyadzi in Chimanimani District.

3.3 Target population

According to Kumar (2018), the target population is an identifiable group of elements of interest to the researcher. The targeted population of this study are households within Ward 8 of Nyanyadzi in the Chimanimani district. To come up with the respondents, the researcher first used stratified sampling where the population was stratified by gender as a proportion of male-headed and female-headed households. Then, a random sample was taken from each stratum, oversampling female-headed households as a way to ensure their adequate representation in the sample. Random sampling was done to collect the quantitative data and this was used to select 45 households as questionnaire respondents, representing 21% of the estimated total of 280 households in the community. Hence, the population of this study comprised of both men and women from the two villages with different livelihoods that are being affected by climate change. The researcher also involved other people who are not severely affected by climate change, those are key stakeholders from the Council, EMA representative and AGRITEX officers.

3.4 Reliability and Validity of the Study

As stipulated by Surmiak (2018), the reliability of the study refers to the extent to which results are consistent over time and are an exact representation of the population under study. Reliable research instruments allow the results to be reproduced again and again as long as a similar methodology is used. To test the reliability of the research instruments, the results were checked for consistency. Validity is the degree to which the interpretations and conceptions have common meanings between the researcher and the participants (Hayashi et al., 2019). A pre-test for the data collection tools was done, where four questionnaires and one interview guide were pretested in the community to determine the validity and reliability before the main research.

3.5 Research Approach

Mixed-methods was adopted for this study, involving the combination of both quantitative and qualitative data collection techniques and the analysis methods to achieve a comprehensive understanding of the research. Through the integration of these methods, the researcher sought to authenticate results obtained through different means, exploring the contextual nuances and deeper meanings in regards to the research topic, and ultimately provide better insights that could inform policy and practice related to enhancing household resilience to climate change.

3.6 Sampling method(s)

The researcher first used stratified sampling where the target population was aggregated by gender as a proportion of male-headed and female-headed households. Then, a simple random sampling method was used to select 45 households meant for questionnaire respondents from an estimated total of 280, hence, this research reached 21 % of the population. This method ensured that each household in the strata had an equal chance of being selected, minimizing selection bias, thereby enhancing the representativeness of the sample. According to Lakens et al. (2016), a representative sample size can start from 20%; hence the sample size for this research is representative. Further, purposive sampling was used for the qualitative component during the selection of key informants with specialized knowledge and experience about the research topic. Qualitative data was collected through semi-structured KIIs with two AGRITEX officers, a Councillor, an EMA representative and two Village Heads, selected for their in-depth knowledge about the climate change and livelihoods issues locally.

3.7 Data collection instruments

To address the research objectives, both quantitative and qualitative data collection tools were used. This mixed-method allowed the triangulation of data, thereby enhancing the validity and reliability of the obtained research findings.

3.7.1 Household Questionnaire

A well-structured household questionnaire was designed to collect mainly quantitative data from the randomly selected sample size of 45 households. The questionnaire contained both closed and open-ended questions, collecting data on demographic information, livelihood options, opinions and perceptions in line with the research topic. A household questionnaire was used based on its ability to capably gather standardized data from the sample, also enabling the identification of patterns and trends within the targeted population (Nyumba et al., 2018). Four questionnaires were pre-tested to ensure reliability, clarity and validity. According to Churchill et al. (2018), administering questionnaires effectively is important to secure dependable research data, necessitates careful planning, transparent communication, and consideration for the respondents' participation. To enrich the accuracy of the data and gain insights into the context of respondents' lives, questionnaires were administered directly at every respondent's homestead, enabling observation of livelihood practices. Also, the questionnaire was presented using the local language, *Shona*. Hence, effective communication was enhanced through the use of local language during both FGDs and household questionnaires and the KII sometimes.

3.7.2. Key Informant Interviews

Semi-structured interviews were done with key informants, inclusive of two village heads, two AGRITEX officers, one EMA representative, and the ward Councillor. KII aimed to gather mostly in-depth qualitative data related to the research topic. The interview guides were designed flexibly, allowing for probing and follow-up questions for the emerging themes. KIIs were also utilized based on their ability to provide rich, contextualized data from individuals, including stakeholders with specialized knowledge and experience on the research topic (Dillman et al., 2014). These KI respondents offered unique insights into the research, complementing the quantitative data collected from the household questionnaires. Purposive sampling was employed to select key informants to ensure that the selected respondents possessed the necessary knowledge to provide valuable and reliable information.

3.7.3 Focus Group Discussions

Three FGDs, each consisting of 10 participants, were conducted, grouped into mixed-gender, women-only, and men-only groups. The FGDs utilized a semi-structured discussion guide to explore respondents' perspectives and opinions on the research topic. Etikan et al. (2016) postulated that FGDs allow interactive discussions and the sharing of different viewpoints. FGDs were employed mainly to capture experiences, opinions and perceptions of a divergent group of people. The division of groups by gender was crucial to explore gender-specific issues and ensure that all voices were heard. The interactive nature of FGDs allowed the exploration of different issues and the identification of underlying social dynamics (Krueger & Casey, 2014). Thus, the data collected from the FGDs provided qualitative insights, complementing the quantitative data from the household questionnaires and qualitative data from the KIIs

3.8 Data analysis procedures

To analyze the collected data for this study, a mixed approach was employed as the data was also collected using the mixed method. This was to ensure a vigorous and better understanding of the research questions. Quantitative data gathered from the household survey were analyzed using descriptive statistics, including calculating means, frequencies, and percentages to describe the demographic profiles of the households, livelihood diversification patterns, and the resilience to climate change. Statistical software like Excel was utilized to ease the data analysis process. Qualitative data, collected from KIIs and FGDs, were analyzed using a combination of content and thematic analysis, following the guidance from Braun and Clarke (2019), who stipulated that the two involve systematically identifying, coding, and interpreting recurrent themes for example, related to climate change, household resilience and livelihood diversification. The process includes thoroughly examining transcripts to identify patterns and develop a coding framework. Content analysis was also used to count and examine the frequency of these identified themes, providing further insight into their occurrence and significance. Triangulation, as supported by Farmer et al. (2019), integrates quantitative and qualitative findings to establish a deeper and more nuanced understanding of the relationships between individuals. In this study, triangulation was used to understand the household resilience, livelihood diversification, and climate change, involving comparing and contrasting findings from different data sources as a way to ensure consistency and coherence, in so doing enhancing the validity and reliability of research findings.

3.9 Data Presentation

Data presentation for this research is organized in a way to efficiently communicate the findings to a diverse audience. The presentation is structured into distinct sections, each targeting a specific research objective. Firstly, the overview of the demographic characteristics of the surveyed households, including data on age, occupation, gender, educational attainment, household size, and composition, was presented using tables and graphs for clarity. As indicated by Bausman and Halina (2018), visual aids such as tables, charts and figures enabling easy comprehension and comparison of the demographic data.

3.10 Ethical considerations

A cover letter was attached on both KII guides and questionnaires clarifying the purpose of the study, which is for academic purposes only. The letter also asked for informed consent to undertake the research from respondents. Thus, participants were well informed about the research, fully understand the study's purpose and procedures. Participation of respondents for this study was voluntary and the interviews were conducted in private to promote confidentiality. Bernard (2017) extrapolated that during data collection, participants must be willing to participate in the research voluntarily. The researcher upheld the confidentiality and anonymity of the respondents by not disclosing the names of respondents during interviews.

3.11 Description of the study area

This study focuses on the Dirikwe and Makotamo area, situated within Nyanyadzi Ward 8 in Zimbabwe's Eastern Highlands. Geographically, an important feature of this location is the presence of the Nyanyadzi Irrigation Scheme. The scheme represents a significant alteration of the natural landscape, characterized by a network of irrigation canals and cultivated plots. These irrigated plots are different from the surrounding natural vegetation and topography of the community. The water supply from the scheme enables intensive smallholder farming, making agriculture the primary livelihood activity for most residents in Dirikwe and Makotamo (Moyo, 2016). The daily lives and economic activities within Dirikwe and Makotamo are closely linked. The local marketplaces act as major centres for trade and social exchange, showing the interconnectedness of these communities (Government of Zimbabwe, 2020). Therefore, the study area is characterized by its agricultural productivity, contributed by the irrigation scheme, and the strong community bonds characterized by shared resources and social relations. The understanding of these geographical and socio-economic characteristics is important for contextualizing the research findings within the two villages, Dirikwe and Makotamo, in Nyanyadzi Ward 8.

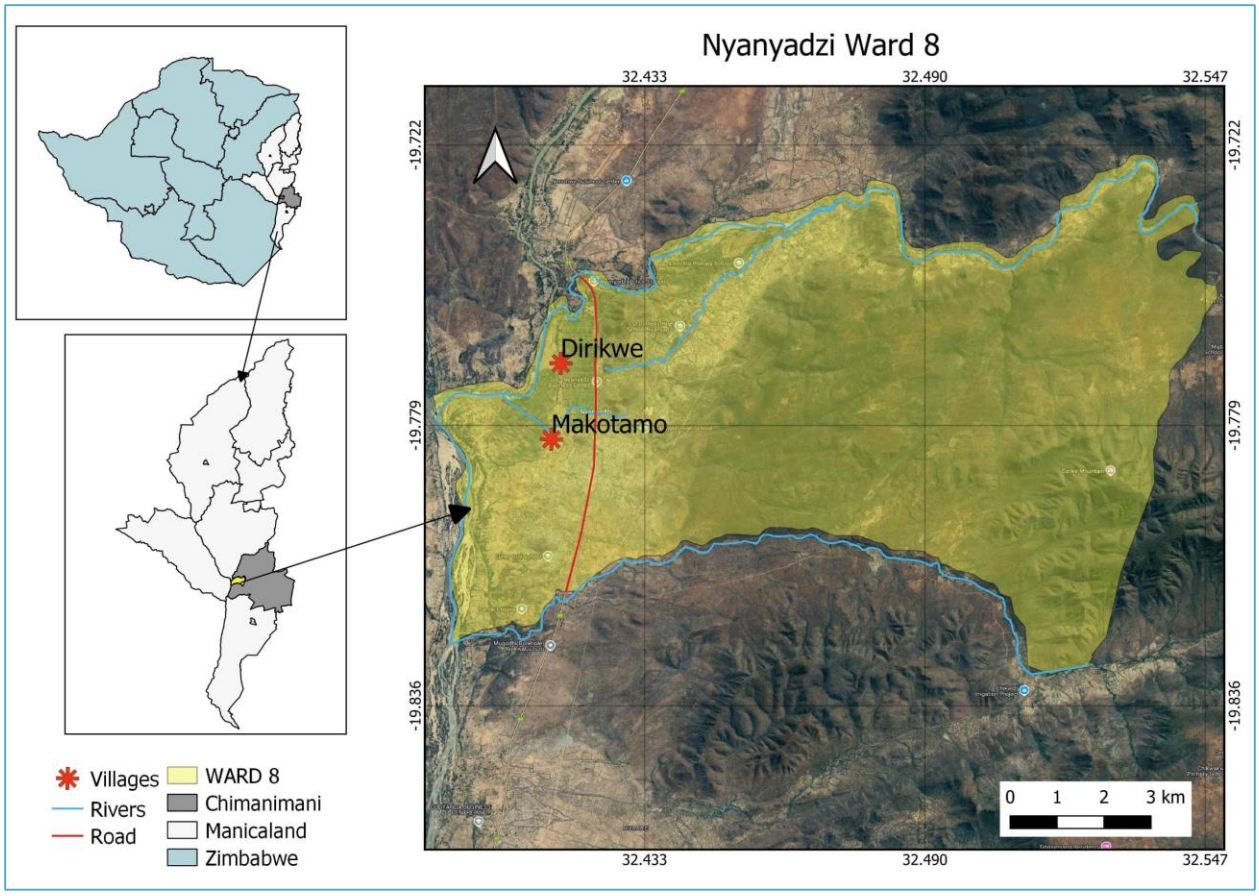

Figure 3.1 shows the location of Makotamo and Dirikwe villages and key geographical features (Primary source)

3.12 Chapter summary

This chapter outlined the methodology employed to explore household resilience to the changing climate through livelihood diversification in Dirikwe and Makotamo Village of Ward 8, Nyanyadzi. A mixed research design was adopted, allowing for the collection and analysis of both quantitative and qualitative data. Quantitative data, collected from household questionnaires administered to a randomly selected sample of 45 households, provided statistical insights into livelihood diversification patterns and climate change perceptions. Qualitative data, obtained from semi-structured KIIs and FGDs, offered contextual depth and nuanced understandings of local experiences and knowledge. Data presentation makes use of tables, figures, and charts to clearly show the demographic characteristics, livelihood diversification options, and household resilience outcomes. The chapter also included ethical considerations observed during the data collection process.

CHAPTER FOUR RESULTS ANALYSIS, PRESENTATION AND DISCUSSION

4.1 Introduction

This chapter presents the research results, links them with related studies, and discusses them concurrently. The findings are based on data obtained from KIIs, FGDs, and household questionnaires administered among people staying in Makotamo and Dirikwe villages, with different household resilience statuses to climate change. This chapter also compared the collected data with the literature reviewed. Data presented includes the demographics of respondents, household livelihood options, the correlation between livelihood diversification and household resilience and the factors that influence the adoption of livelihood diversification in the area under study. Various visual methods, including tables, graphs, and pie charts, were used to present the data as a way to effectively communicate key findings and patterns.

4.2 Respondent rates

In research, the response rate reflects the proportion of sampled individuals who participated in a survey (Creswell, 2018). In this study, a 100% response rate across all data collection methods was achieved. As Mailu et al. (2021) suggested, a response rate exceeding 50% enhances research trustworthiness. As a result, the researcher was able to assess the validity of the research outcomes based on this high level of participation.

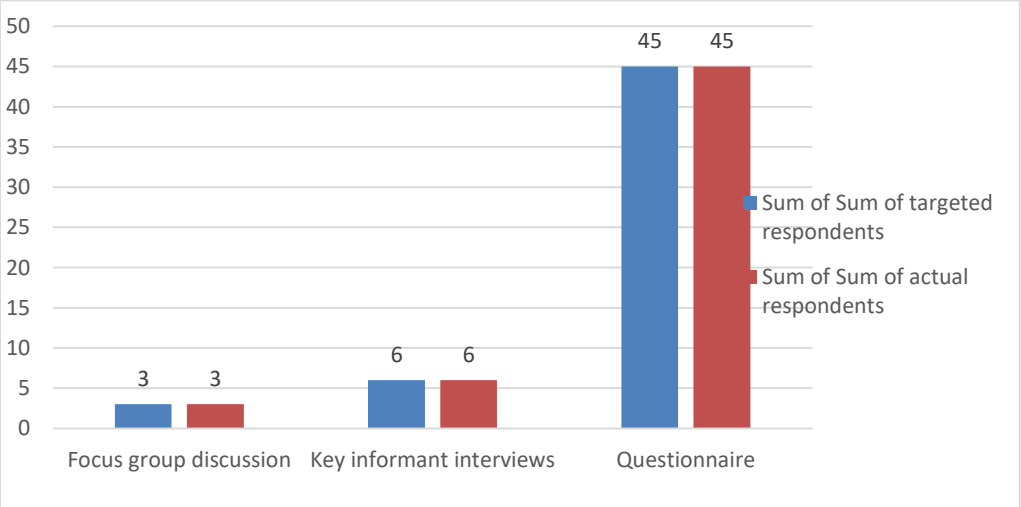

Figure 4.1 shows response rates for FGDs, KIIs and household questionnaires (Primary Source)

4.2.1 Gender of household questionnaire respondents

This research adopted a gender-responsive lens, acknowledging the disproportionate impacts of climate change on women and men within the study area. As a result, the data collection process actively prioritized the participation of female respondents to ensure their experiences and perspectives on livelihood diversification and climate change are well understood. This deliberate effort led to a sample composition of 62% women and 38% men, allowing for a more nuanced exploration of gender-specific vulnerabilities and capacities in the face of climate change.

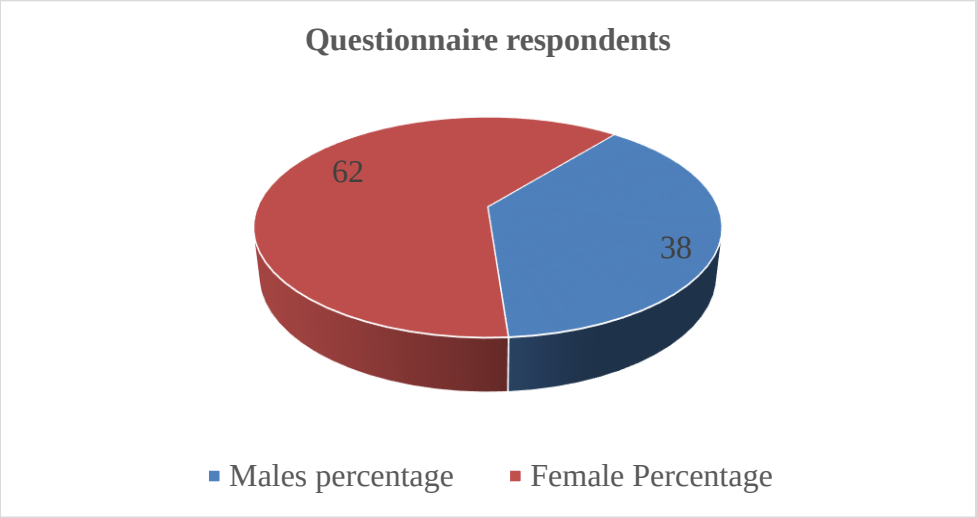

Figure 4.2 shows the gender of household questionnaire respondents (Source: Primary data)

This research employed a gender-responsive approach, recognizing the unequal impact of climate change on women and men. Consequently, the data collection prioritized the voices of female respondents, resulting in a sample comprised of 62% women and 38% men. This focus ensured that the lived experiences and perspectives of those most affected by climate change were central to the study. Conducting three FGDs, one with males only (N=10), one with females only (N=10), and a mixed group (N=10; 5 males, 5 females) is crucial for understanding the differentiated vulnerabilities and capacities of men and women in the face of climate change, ensuring that adaptation and mitigation efforts are equitable and effective. Nazareth et al. (2022) stipulated that the inclusion of a mixed-gender FGD further facilitates the exploration of how different genders interact, share information, and collectively perceive climate change issues, potentially revealing shared concerns and divergent viewpoints that might be missed in single-sex groups.

4.2.2 Demographic information of the respondents

This section highlights the demographic characteristics of the household questionnaire respondents that were useful in determining the research's objective. These include age, marital status, gender, and household size and level of education.

Table 4.1 Respondents' demographics for the household questionnaire

Variable	Category	Household frequency	Household %
Age (years)	20-30	8	17.8
	31-40	11	24.4
	41-50	11	24.4
	50-60	7	15.6
	60+	8	17.8
Marital status	Single	12	26.7
	married	22	48.9
	Divorced	5	11.1
	Widowed	6	13.3
Household size (number of members	1-4	23	51.1
	5-8	15	33.3
	8 and above	7	15.6
Level of education	Primary	13	28.9
	Secondary	24	53.3
	Tertiary/ Vocational	3	6.7
	None	5	11.1

Source: Primary data

The most represented age groups were 31-40 years and 41-50 years, each with 11 participants. Following these were respondents above 60 years (8 participants) and those aged 50-60 years (7 participants). This distribution indicates a mix of age groups within the two villages. The age distribution, with a significant representation of individuals in the economically active age groups (31-50 years), suggests a potential workforce capable of engaging in diverse livelihood activities. However, the notable presence of older respondents (60+ years) also highlights the need to consider the resilience capacities of potentially more vulnerable households.

A significant portion of respondents (26 out of 45) reported household sizes of 1-4 individuals, suggesting a preference for smaller families, which resonates with the assertion by Hosany & Hamilton (2023) that smaller families often demonstrate a greater capacity to navigate periods of hunger. This was followed by a cohort with 5-8 members with 15 households, indicating that larger families are less common, possibly for the same reasons. This could imply that resilience strategies need to consider the scale of household needs and resource management capabilities, which might differ for the 15.6% of households with 8 or more members.

The majority of respondents had attained primary education (53%), followed by those with secondary education (28.8%). Only a small percentage (6.7%) had pursued tertiary education. This suggests that access to higher education is limited in Dirikwe and Makotamo villages, likely due to financial constraints and the prioritization of basic needs like food. This has implications for the types of livelihood diversification options that households pursue, potentially favoring those requiring lower levels of formal education. The 11.1% with no formal education may face additional barriers in adopting new livelihood strategies and building resilience. Therefore, interventions aimed at enhancing resilience through livelihood diversification need to be tailored to the existing educational profiles within the community, potentially including skills development and training programs accessible to individuals with varying levels of education. The majority of respondents (22 out of 45 households) were married, reflecting the community's value of marriage. Hosany & Hamilton (2023) stipulated that societies that value marriages provide a support system for households in coping with challenges such as food shortages, where both spouses can contribute to securing resources. This social capital could be a crucial factor in implementing and sustaining livelihood diversification strategies.

4.3 Analysis of findings in line with research objectives.

4.3.1 Research Objective 1: Households' livelihood options in Makotamo and Dirikwe Village, Nyanyadzi Ward 8.

Makotamo and Dirikwe villages employ different livelihood strategies to promote resilience in the face of climate change. Traditional practices such as farming and livestock rearing remain dominant for food security and income, however, they are evolving to incorporate drought-resilient strategies. The villages are increasingly adopting climate-smart alternatives like beekeeping, agroforestry, and food processing. Also, craft production offers vital off-farm income, particularly for this community being affected by climate change. These livelihood options contribute to the income generation and food security for households in both villages.

4.3.1.1 Livelihood options for households in Dirikwe and Makotamo villages

This section presents the perceived importance of various livelihood strategies in the Makotamo and Dirikwe villages as a response to climate change. A Likert scale was used to collect the data, and the results showed that farming, with the highest average score, remains central for food security and income, prompting a shift towards drought-resilient crops. Livestock rearing serves as a crucial buffer and income source, with a focus on indigenous breeds. Beekeeping, agroforestry, and food processing are recognized for their climate-smart potential and contributions to income and food security. Horticulture within irrigation schemes offers high-value opportunities but faces infrastructural challenges, while craft production provides off-farm income, particularly for marginalized groups.

Table 4.2 Livelihood options and the level of importance in Makotamo and Dirikwe villages.

Livelihood strategy	Not important at all	Somewhat important	Neutral	Somewhat important	very important
Farming					4.8
Livestock rearing					4.5
Beekeeping				3.9	
Fish farming			3.5		
Agroforestry				4.2	
Horticulture					4.6
Craft production				3.8	
Food processing				4.1	

(**Source**: primary data)

a) Farming

With an average score of 4.8, farming is considered very important in Makotamo and Dirikwe village. It serves as the primary source of both food security and income for most households, rendering it indispensable despite the negative impacts of climate change-related droughts. Communities demonstrate resilience by continuing to engage in farming practices. In line with observations in the Lowveld, a shift towards drought-resilient crops is evident. Farmers predominantly cultivate small grains such as sorghum and millet, prioritizing indigenous varieties known for their hardiness (Manyanhaire & Jiri, 2019). These

crops are vital for ensuring food availability, especially during periods of unpredictable rainfall. During the FGD, one young female respondent stipulated that "the growing of drought-resistant crops like rapoko, sorghum, and millet provides a reliable source of food, unlike growing maize, especially using hybrid seeds that are very prone to drought". Hence, farming plays a great role in enhancing the resilience of smallholder farmers, and there is a need to shift from the growing of long-seasoned varieties and hybrid seeds to the growing of drought-resistant crops in the face of climate change.

b) Livestock Rearing

Ranking as the second most important livelihood strategy, livestock rearing received an average score of 4.5, signifying very important. Livestock acts as a crucial buffer during crop failures, provides a reliable source of income, and holds significant social capital within the communities. This also concurs with the study that was done by Paumgarten et al. (2020), which stated that at the household level, common coping mechanisms comprise selling assets like livestock to earn income for immediate needs such as food and basic health services. Reflecting a focus on animals adapted to arid environments, livestock rearing remains a key component of livelihoods (Nkomo & Nyathi, 2020). Goats and indigenous cattle breeds are favored for their resilience. Given the challenges of water scarcity, reliance on boreholes and seasonal rivers is common. Destocking strategies are also increasingly implemented to manage livestock numbers during droughts, providing income and reducing pressure on grazing resources (Dube & Moyo, 2022). In the study area, most farmers keep large stocks as they regard livestock as a source of wealth.

c) Beekeeping

Beekeeping is perceived as somewhat to very important, with an average score of 3.9. The study revealed that beekeeping offers a valuable source of income and dietary supplements and is recognized as a climate-smart practice. Although the regions have limited forage, beekeeping is among the sustainable livelihood options in the face of climate change. Both modern and traditional beekeeping techniques are utilized. The harvested products, including honey, beeswax, propolis, and pollen, are sold in local markets. Additionally, beekeeping contributes to biodiversity conservation through its role in pollination (Chikwanda & Nyamadzawo, 2017). On the other hand, the severity of climate change impacts is greatly affecting bee farming with reduced bee forage production.

d) Fish Farming

Fish farming holds a rating of neutral to somewhat important, with an average score of 3.5. While acknowledging its contribution to dietary diversification, its impact is currently limited by water

availability. Where perennial water sources are accessible, small-scale fish ponds, often utilizing rainwater harvesting, are constructed for fish farming. Tilapia, a hardy species tolerant of fluctuating water conditions, is the most commonly farmed fish. Mhlanga & Siziba (2020) stated that efforts are underway to explore integrated aquaculture systems to maximize resource utilization. The development of drought-resistant fish breeds and water-efficient aquaculture technologies is considered crucial for the future sustainability of this livelihood

e) Agroforestry

Agroforestry is considered somewhat to very important, with an average score of 4.2. This practice offers multiple benefits, including improvements in soil fertility, provision of shade, and a source of diverse products. Trees provide essential shade, enhance soil fertility, and supply fuel wood. Indigenous fruit trees, such as *musharu* and *moringa* are incorporated into farming landscapes as they are also drought-resistant. Agroforestry systems contribute to climate change mitigation through carbon sequestration and the enhancement of biodiversity (Mapuranga & Mushore, 2018). Farmers are increasingly recognizing the value of integrating trees into their farming systems, and there is a need for continued awareness raising on the importance of agroforestry and afforestation at large.

f) Horticulture in Irrigation Schemes

Horticulture within irrigation schemes is rated as very important, with an average score of 4.6. Irrigation schemes provide a reliable water source, enabling the production of high-value crops such as vegetables and fruits, which in turn offer a dependable source of income. Water-efficient technologies like drip irrigation are employed to maximize water use. Establishing strong market linkages and engaging in value-added activities are crucial for enhancing the profitability of horticultural endeavors (Chirima & Mufandaedza, 2021). In the KII," the village head explained, "we are struggling with the irrigation scheme. The infrastructure is falling apart, and because some of the channels are no longer functioning, the area we can irrigate is getting smaller and smaller negatively affecting production". Accordingly, repairing the irrigation infrastructure is a requisite to promote agricultural production.

g) Craft Production

Craft production is considered somewhat to very important, with an average score of 3.8. This provides a significant off-farm livelihood option, particularly for women and marginalized groups. Craft products, including baskets, mats, and pottery, are made using locally sourced materials and sold in local markets and to tourists. The formation of craft cooperatives and the implementation of marketing initiatives are aiding

in improving profitability. Sustainable harvesting practices are essential to ensure the long-term availability of raw materials. Furthermore, craft production plays a vital role in preserving traditional knowledge and cultural heritage (Sibanda & Dube, 2019), this is similar to the research that was conducted by Celio et al. (2023) who stipulated that craft production is another non-agricultural activity that can provide households with an income generation not directly dependent on agricultural productivity.

h) Food Processing

Food processing is rated as somewhat to very important, with an average score of 4.1. These activities enhance food security, reduce post-harvest losses, and increase the value of agricultural products. The processing of fruits and vegetables into products like dried goods is becoming increasingly common in Makotamo and Dirikwe villages. Traditional food processing methods, such as drying meat (biltong) and fermenting beverages, also remain important. Small-scale processing enterprises receive support from government and non-governmental organizations, mostly in terms of training. Food processing plays a key role in mitigating post-harvest losses and improving access to markets

4.3.1.2 Household livelihood options practised before and after the year 2000 in Makotamo and Dirikwe Villages, Nyanyadzi Ward 8

The information below presents a comparative analysis of household livelihood options practised in Makotamo and Dirikwe villages before and after the year 2000, a period often associated with increased climate change impacts. This temporal comparison allows the researcher to observe shifts in livelihood strategies adopted by households in response to evolving environmental conditions. Notably, traditional climate-sensitive practices like crop farming and livestock rearing show a marked decline in prevalence after the year 2000. Conversely, alternative and potentially more resilient options such as craft production and trade/vending have gained prominence, indicating adaptive strategies within the communities. This data underscores the dynamic nature of livelihood choices in the face of climate change.

Table 4.3 Household livelihood options practised before and after the year 2000

Livelihood option	Frequency before the year 2000	Percentage before the year 2000	Frequency after the year 2000	Percentage after the year 2000	Variation in percentage
Crop farming	36	80	22	48.9	-31.1
Livestock rearing	22	48.9	13	28.9	-20

Beekeeping	7	15.6	11	24.4	8.8
Fish farming	5	11.1	3	6.7	-4.4
Agroforestry	29	64.4	17	37.8	-26.6
Horticulture	15	33.3	9	20	-13.3
Craft production	11	24.4	18	40	15.6
Food processing	27	60	24	53.3	-6.7
Herbal medicine	13	28.9	16	35.6	6.7
Other Livelihoods like trade and venting	22	48.9	29	64.4	15.5

Source: Primary source

This research reveals significant changes in how households sustain themselves across these two periods. The year 2000 is often recognized as a point after which the consequences of climate change, such as more frequent and intense droughts and unpredictable rainfall, became increasingly evident in numerous regions (IPCC, 2022). Before the year 2000, crop farming, characterized mainly by growing small grains, was the dominant livelihood activity, engaging 80% of households. This concurred with the research carried out by Musarandega et al. (2020), which elucidated that in Chimanimani, households have started unique coping strategies to deal with climate-related challenges like drought. One approach employed includes the growing of drought-tolerant crop varieties like sorghum and cowpeas, which are suitable for the local climate.

However, this engagement significantly decreased to 48.9% after the year 2000, marking a substantial 31.1% reduction. This decline stems from the growing uncertainty of rainfall patterns, rendering rain-dependent agriculture increasingly precarious (Morton, 2019). Similarly, livestock rearing, another sector vulnerable to climate variability, saw a 20% decrease, probably due to increased water scarcity and reduced availability of grazing lands. Agroforestry also experienced a notable reduction of 26.6%, suggesting that the establishment and maintenance of long-term agroforestry initiatives face challenges under increasing climatic uncertainties. During a KII, an AGRITEX Officer stated directly, “The only way farmers can ensure food security is through the adoption of agroecology, which mainly focuses on soil and water conservation techniques; farmers must implement soil and water conservation practices like agroforestry, the use of swales, and green manure cover crops."

Equally, the adoption of certain livelihood strategies increased after the year 2000, indicating a move towards more climate-resilient alternatives. Craft production and trade/vending experienced significant

increases of 15.6% and 15.5%, respectively. These activities offer greater adaptability and are less reliant on stable climatic conditions, providing households with a safety net against agricultural losses (Ellis, 2018). Beekeeping also showed a positive change of 8.8%, potentially reflecting its suitability in drier conditions and its capacity to generate income despite climate change. Furthermore, the use of herbal medicine increased by 6.7%. This rise might be attributed to the unaffordability of conventional medicine during times of difficulties, prompting a shift towards traditional practices.

4.3.2 Research Objective 2: The effectiveness of different livelihood strategies in enhancing household resilience to climate change in Makotamo and Dirikwe, Nyanyadzi Ward 8.

4.3.2.1 Household satisfaction from different livelihood strategies

An analysis of the income satisfaction levels among households in Makotamo and Dirikwe villages, focusing on the various livelihood strategies employed in the face of low rainfall and climate change impacts, was also conducted. Income generated from different livelihood strategies was ranked using the Likert scale represented by: 1. “very dissatisfied”, 2. “Somewhat dissatisfied” 3. “Neutral” 4. “Somewhat satisfied” 5. "Very satisfied"). Livelihoods ranked included farming, livestock production, formal employment, informal trade, and remittance, among others. Respondents were greatly satisfied with livelihood strategies that are not directly affected by climate change, evidencing the prevalence of climate change.

Table 4.4 Aggregated responses from surveyed households, illustrating their satisfaction levels with income generated from each livelihood strategy

Livelihood Strategy	Average Likert Scale Score (1-5)
Farming (Sorghum, Millet, Cowpeas)	2.5
Livestock Rearing (Goats, indigenous cattle)	3.0
Beekeeping	3.8
Fish Farming	3.5
Agroforestry	3.2
Horticulture (Irrigation Schemes)	4.2
Craft Production	3.3
Food Processing	3.6

(Source: Primary data**)**

1. Farming (Sorghum, Millet, Cowpeas): Limited Income Satisfaction

The average Likert scale score of 2.5 for farming indicates a low level of income satisfaction. Smallholder farmers in the Makotamo and Dirikwe villages cultivate sorghum, millet, and cowpeas and face significant challenges due to erratic rainfall and frequent droughts. The inherent limitations of rain-fed agriculture, coupled with the increasing frequency of climate-related shocks, result in unpredictable yields and limited income. Farmers often express dissatisfaction with the low market prices for these drought-resistant crops, further contributing to their financial struggles.

2. Livestock rearing (goats, indigenous cattle): Moderate income satisfaction

Livestock rearing, with an average score of 3.0, shows moderate income satisfaction. The rearing of goats and indigenous cattle provides a more stable income source compared to crop farming, as livestock can be sold during dry periods to mitigate financial losses. However, the increasing frequency of droughts and the rising cost of supplementary feed have impacted profit. Farmers express concerns about the fluctuating market prices for livestock and the challenges of maintaining herd health in a water-scarce environment. The score reflects that livestock is a more reliable income source than crops, but is still vulnerable to climatic shocks. Dube & Moyo (2022) discuss destocking strategies during droughts, which can impact income stability. In the study area, the death of cattle is mainly high during dry spells due to scarcity of both water and pastures, yet supplementary feeding is hardly afforded by smallholder farmers.

3. Beekeeping: Relatively High Income Satisfaction

Beekeeping, with an average score of 3.8, indicates relatively high income satisfaction. The activity requires minimal water and land resources, making it well-suited to the Lowveld's arid conditions. Farmers appreciate the relatively stable income generated from honey, beeswax, and other bee products. The growing demand for these products in local and urban markets further enhances profitability. The higher satisfaction score suggests that beekeeping is a viable and profitable livelihood option in the region. Chikwanda & Nyamadzawo (2017) emphasize beekeeping as a climate change adaptation strategy, which is reflected in the positive income satisfaction.

4. Fish Farming: Moderate to High Income Satisfaction

Fish farming, with an average score of 3.5, shows moderate to high income satisfaction. While limited by water availability, fish farming provides a valuable source of income and protein. Farmers who have access to perennial water sources or utilize rainwater harvesting techniques report relatively stable income from

selling tilapia and other fish species. The score indicates that where water is available, fish farming provides a good income source. Mhlanga & Siziba (2020) discuss the potential of aquaculture in enhancing food security and income in dry areas. Hence, the integration of fish farming with other agricultural activities further enhances profitability.

5. Agroforestry: Moderate Income Satisfaction

Agroforestry, with an average score of 3.2, shows moderate income satisfaction. The integration of trees into farming systems provides a range of benefits, including income from fruit sales, fuel wood, and timber. However, the long gestation period for some tree species and the fluctuating market prices for agroforestry products can impact profitability. The score reflects that agroforestry provides a supplementary income, but is not always a primary source. Mapuranga & Mushore (2018) highlight the role of agroforestry in enhancing climate resilience and livelihood diversification. One respondent during an FGD stated that “farmers who have diversified their agroforestry systems and developed market linkages report higher income satisfaction through selling different fruits, like mango."

6. Horticulture (Irrigation Schemes): High Income Satisfaction

Horticulture in irrigation schemes, with an average score of 4.2, exhibits the highest income satisfaction. Access to reliable water sources allows farmers to grow high-value crops, such as vegetables and fruits, throughout the year. The use of water-efficient irrigation technologies and the development of market linkages further enhance profitability. Farmers in irrigation schemes report significantly higher incomes compared to those relying on rain-fed agriculture. During a FGD, one female participant stated, "With efficient irrigation systems, the impact of drought can be lessened, and the community at large can also be relieved from hunger as they could purchase grains and vegetables locally at lower prices compared with traveling to Rusitu, ward 21 in the same district to source food, mainly grains”. The score supports that irrigation schemes are a key source of income in the area.

7. Craft Production: Moderate Income Satisfaction

Craft production, with an average score of 3.3, shows moderate income satisfaction. The activity provides a valuable source of income for marginalized groups. However, the fluctuating demand for craft products and the challenges of accessing markets impact profitability. Farmers who have formed craft cooperatives and developed marketing initiatives report higher income satisfaction. Sibanda & Dube (2019) emphasize the role of craft production in livelihood diversification and cultural preservation. This view was echoed by a male FGD participant who noted, "Both men and women are greatly involved in craft making, especially

making mats, baskets, and hats, adding that craft making is better and not as badly affected by low rainfall compared to other livelihoods like crop farming." Thus, the score for this study shows that craft production provides a supplementary income, although it is dependent on market conditions.

8. Food Processing: Moderate to High Income Satisfaction

Food processing, with an average score of 3.6, shows moderate to high income satisfaction. The processing of agricultural products into value-added goods, such as dried foods, enhances market access and profitability. Farmers who have established small-scale processing enterprises and developed market linkages report higher income satisfaction. The score reflects that food processing add value to farm produce and creates income. Ncube & Siziba (2020) discuss the potential of food processing in enhancing food security and income. The study revealed that almost 20% of respondents are into honey processing, and they affirmed that this is another source of income that assists farmers despite climate change impacts.

4.3.2.2 Likelihood of continued livelihood strategies

To understand the future trajectory of livelihood strategies in the Dirikwe and Makotamo villages, respondents were asked to rate the likelihood of their continued engagement in five key activities. The results provide a valuable snapshot of the perceived sustainability of these strategies. The results of the Likert scale assessment reveal important insights into the perceived sustainability of livelihood strategies in the two villages. The high likelihood of continued engagement in farming and livestock production underscores the fundamental importance of agriculture in the region. Farmers are actively adapting their practices to mitigate climate risks, demonstrating resilience and a commitment to these traditional livelihood activities. The data collected provides insights into the perceived sustainability and viability of these strategies in the context of climate change and economic challenges. This analysis includes both on-farm and off-farm livelihood activities and incorporates relevant literature. The scale was 1-5, where 1 is "not likely at all" and 2. “Unlikely” 3. “Neutral” 4. “Likely” 5 is "very likely"

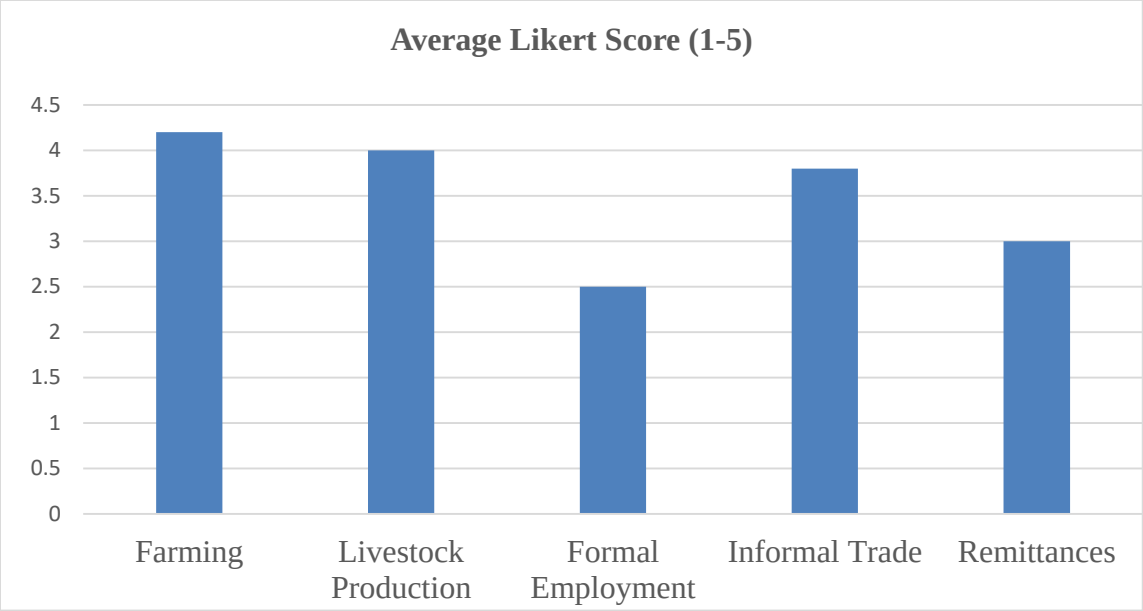

Figure 4.3 shows the livelihood strategy and average scale for the likelihood of continued engagement (Primary source)

i) **Farming (Average Score: 4.2)**

Farming received the highest average score of 4.2, indicating a strong likelihood of continued engagement. This reflects the fundamental importance of agriculture in the Dirikwe and Makoamo villages, despite the challenges posed by climate change. Smallholder farmers view farming as a core livelihood activity, essential for food security and income generation. As noted by Cilliers et al. (2020), most rural households refer agriculture as the backbone of their communities, with many engaging in subsistence farming characterized by the cultivation of crops such as maize, beans, and vegetables. The data illustrate a strong reliance on farming and a belief that, even with climate change, agriculture will remain a key component of their livelihoods. The high score indicates that farmers are willing to innovate and adapt their practices to sustain farming. During an FGD, one female respondent elaborated in detail, "Most of the farmers around here who consistently have enough food are the ones who primarily cultivate small grains, make extensive use of mulching techniques, integrate various crops with green manure cover crops to enrich the soil, and have invested in digging swales across their land". These swales are crucial because they effectively capture and hold rainwater, which significantly helps in promoting long-term moisture retention in the soil, even during drier periods.

ii) Livestock Production (Average Score: 4.0)

Livestock production also received a high average score of 4.0, indicating a strong likelihood of continued engagement. Livestock remains a crucial asset and source of income in the study area, providing a buffer against crop failure and economic shocks. The high score reflects the resilience of livestock production in arid environments, with farmers adapting by rearing indigenous breeds and implementing rotational grazing systems (Nkomo & Nyathi, 2020). The high score suggests that livestock rearing is seen as a long-term strategy, and farmers are willing to make changes to their livestock management to continue their activities. This also takes into account the rearing of small livestock like goats that are most adaptable to climate change, compared to hybrid cattle that can be seriously affected by drought caused by climate change.

iii) Formal Employment (Average Score: 2.5)

Formal employment received the lowest average score of 2.5, indicating a relatively low likelihood of continued engagement. This reflects the limited availability of formal employment opportunities in the Lowveld, particularly in Makoamo and Dirikwe villages. The low score also suggests that respondents perceive formal employment as less reliable and stable compared to other livelihood strategies. The lack of industrial development in the Lowveld, coupled with the national economic situation, contributes to the limited opportunities for formal employment.

iv) Informal Trade (Average Score: 3.8)

Informal trade received a relatively high average score of 3.8, indicating a strong likelihood of continued engagement. This reflects the importance of informal trade as a flexible and accessible livelihood strategy in Dirikwe and Makoamo villages. Informal trade provides opportunities for income generation, particularly for women and marginalized groups. The high score suggests that respondents perceive informal trade as a viable and adaptable strategy, capable of responding to changing economic conditions. The score shows the importance of informal trade as a backup and primary income generator. The limited availability of formal employment opportunities necessitates a greater reliance on informal trade and other self-employment activities

v) Remittances (Average Score: 3.0)

Remittances received a moderate average score of 3.0, indicating a neutral likelihood of continued engagement. Remittances play a significant role in supporting household livelihoods in the Dirikwe and Makotamo, particularly during times of hardship. However, the reliance on remittances can be unpredictable, depending on the economic circumstances of migrant workers. The score suggests that remittances are seen as a supplementary income source, rather than a primary livelihood strategy. Wamalwa (2020) stipulated that households that diversify their livelihoods through off-farm activities like small-scale business and remittances are more likely to achieve food security and improved livelihoods despite different climate-related shocks and challenges. The growth in non-farm activities like craft production and trade, alongside the increased adoption of beekeeping, points toward a strategic diversification aimed at lessening dependence on climate-sensitive livelihoods. This diversification is vital for strengthening household resilience and ensuring food security when faced with climate-related shocks and this is also related to the research conducted by Chingarande et al. (2020) that stipulated that in Zimbabwe, the Masvingo Province as an example, households diversify into horticultural, small-scale mining, livestock farming as well as craft production.

4.3.2.3 Effectiveness of livelihood strategies in adapting to climate shocks

Table 4.5: Perceived effectiveness of livelihood strategies in adapting to climate shocks (Likert Scale 1-5)

Livelihood Strategy	Average Score	Interpretation
Farming	2.8	Neutral to Somewhat Ineffective
Livestock Production	3.2	Neutral
Formal Employment	3.8	Somewhat Effective
Informal Trade	3.5	Neutral to Somewhat Effective
Remittances	4.1	Somewhat Effective to Very Effective

(Source: Primary data**)**

1. Farming (Average Score: 2.8): Neutral to Somewhat Ineffective

Farming, traditionally a primary livelihood source in the Makotamo and Dirikwe villages, received an average score of 2.8, indicating a neutral to somewhat ineffective perception among respondents. This suggests that households recognize the increasing vulnerability of rain-fed agriculture to climate variability. The erratic rainfall patterns, prolonged droughts, and increased frequency of extreme weather events have significantly impacted crop yields, leading to food insecurity and income losses (Manyanhaire & Jiri, 2019).

Farmers expressed concerns about the unpredictability of rainfall, making it difficult to plan and implement effective farming practices. Farmers who rely on traditional farming methods grow climate-resilient crop varieties like sorghum and millet, they obtain better harvests than those who grow hybrid varieties. Be that as it may, there is a need for enhanced extension services, improved access to climate information, and increased promotion of climate-smart agriculture practices as they are crucial for enhancing the adaptive capacity of farming in the Lowveld.

2. Livestock Production (Average Score: 3.2): Neutral

Livestock production received an average score of 3.2, indicating a neutral perception among respondents. While livestock is considered an asset and a buffer against climate shocks, its effectiveness is increasingly challenged by water scarcity and pasture degradation. Droughts have led to significant livestock losses, reducing household assets and income (Dube & Moyo, 2022). The rising costs of supplementary feed and the difficulty in accessing water for livestock during dry periods further contribute to the perceived limitations of livestock production as an adaptation strategy. However, the inherent resilience of indigenous breeds and the adoption of rotational grazing systems offer some degree of adaptive capacity. During a KII, the AGRITEX officer explained in detail, "It is a concerning situation here; we see many farmers facing severe hunger, and it is not because they lack assets entirely. A significant number own livestock, like cattle and goats, which could be a source of income to buy food. However, there is a strong reluctance to sell these animals, even when facing starvation. We have witnessed instances where these livestock end up dying due to prolonged drought, the shortage of pastures, and the lack of water for them to drink. It is a complex issue, this unwillingness to part with their animals, even when it is a matter of their food security." So there is a need to educate the community about destocking.

3. Formal Employment (Average Score: 3.8): Somewhat Effective

Formal employment received an average score of 3.8, indicating a somewhat effective perception among respondents. This suggests that households recognize the stability and predictability of formal employment to cope with climate shocks. Regular income from formal employment provides a safety net, enabling households to purchase food and other essential goods during agricultural stress (Desalegn & Ali, 2018). However, access to formal employment is limited in the Lowveld, particularly in the study areas. Nevertheless, the perceived effectiveness of formal employment highlights the importance of diversifying livelihood options beyond agriculture. During a KII, the Ward 8 Councillor elaborated in detail, "Formal employment opportunities within Nyanyadzi are extremely limited, and this lack of stable income is a major

challenge for households here. While finding formal jobs is crucial, we desperately need to improve our existing infrastructure, particularly the irrigation scheme".

The councillor added that "If we can enhance the irrigation system, it would empower our farmers to not only grow enough crops to feed their families but also to produce a surplus that they can sell to earn a living. As the situation currently stands, hunger is widespread across most households due to these recurring droughts and the high levels of unemployment in the area. This desperation is also exacerbating the problem of theft within our community, as people struggle to meet their basic needs." The concentration of formal employment opportunities in urban centres necessitates migration, which can have social and economic implications for households.

4. Informal Trade (Average Score: 3.5): Neutral to Somewhat Effective

Informal trade received an average score of 3.5, indicating a neutral to somewhat effective perception among respondents. Informal trade activities, such as selling agricultural produce, crafts, and other goods, provide a flexible and adaptable source of income. This flexibility is particularly valuable in the context of climate shocks, as households can quickly adjust their trading activities to respond to changing market conditions. According to Mansur & Djaelani (2023), the effectiveness of informal trade is influenced by factors such as market access, competition, and the availability of goods. The disruption of market access due to a shortage of products and damage caused by extreme weather events can limit the effectiveness of informal trade as an adaptation strategy. The need for improved market infrastructure and the promotion of value-added activities are crucial for enhancing the role of informal trade in building resilience.

During a KII, the village head explained in great detail, "The recurring droughts have created a very difficult situation for our community. Typically, what happens is that men have to travel to Chipinge District to trade things like baobab fruit and kapenta fish, what we call '*matemba*,' in exchange for grains. Sometimes, they sell these items for money just to be able to buy food for their families. In households headed by women, they are also forced to make these arduous trips to trade, leaving their children completely unattended and vulnerable. This lack of supervision exposes our young girls to terrible risks, like rape and ultimately, early marriage. Hunger is a deeply disturbing issue in our community, and it is clear that we desperately need more life-changing projects. Support for the irrigation scheme is vital. These initiatives offer a real pathway towards greater food security and would help alleviate the immense suffering we are currently experiencing".

5. Remittances (Average Score: 4.1): Somewhat Effective to Very Effective:

Remittances received the highest average score of 4.1, indicating a somewhat effective to very effective perception among respondents. Remittances from family members working in urban centres or abroad provide a crucial source of income for households in the study area. Wamalwa (2020) stipulated that households that diversify their livelihoods through off-farm activities like small-scale businesses and remittances are more likely to achieve food security and improved livelihoods despite different climate-related shocks and challenges. These funds help to alleviate food insecurity, cover essential expenses, and invest in livelihood activities. The reliability and regularity of remittances make them a valuable adaptation strategy, particularly during periods of agricultural stress. However, reliance on remittances can create dependency syndrome and may not be sustainable in the long term. The need to diversify livelihood options and build local economic capacity is essential for reducing reliance on external sources of income.

4.3.3 Research Objective 3: Factors that influence the adoption of livelihood diversification strategies by households in Ward 8, Nyanyadzi.

Livelihood diversification, a strategy employed by households to enhance their well-being and resilience, is shaped by a complex set of factors. These factors compel or enable households to pursue a range of income-generating activities beyond their traditional means. The understanding of these influences is crucial for designing effective interventions and policies that support sustainable livelihood development.

4.3.3.1 Climate-related shocks

One of the primary drivers of livelihood diversification is the increasing frequency and intensity of climate-related shocks. Events such as droughts, floods, and unpredictable rainfall patterns can severely disrupt traditional agricultural livelihoods, forcing households to seek alternative income sources (Kassie and Aye, 2017). During the household questionnaires interviews, households facing these challenges rate this factor as "very important" (5) in their decision-making process as they strive to mitigate the risks associated with climate variability and ensure their economic survival. The village head, during a KII, stated, "We have observed a significant shift in how the community is earning a living. Declining agricultural productivity is forcing many households to diversify. They are increasingly involved in craft work, and more people are migrating to urban areas in search of work. Many families now rely heavily on remittances. However, these new paths are not without their problems". The economic instability in the cities makes those livelihoods very precarious, marked with reduced remittances.

4.3.3.2 Access to credit

Access to credit plays a vital role in facilitating livelihood diversification. Credit enables households to invest in new activities, acquire necessary resources, and overcome financial barriers to start new initiatives (Gebru et al., 2017). The importance of credit varied, ranging from "somewhat important" (4) to "very important" (5). For instance, access to microfinance or other financial products empowers individuals to start small businesses or invest in new agricultural techniques, thereby diversifying their income streams. In the case of Makotamo and Dirikwe village, formal credit from banks and microfinance institutions is limited. Therefore, informal credit sources, such as loans from relatives, friends, or local moneylenders, are more prevalent. The reliance on informal credit underscores the gaps in formal financial inclusion and the associated vulnerabilities (Lozychenko, 2021). The analysis also demonstrated that the debt burden often increased following climate shocks as households took on additional loans to cover immediate needs.

During an FGD, a participant highlighted the crucial role of Income-Saving and Lending Initiatives (ISALs), such as *mukando*, in empowering individuals to generate income and establish small businesses within the community. She emphasized that these initiatives serve as vital mechanisms for financial inclusion, particularly for those with limited access to traditional banking services. However, she also articulated significant challenges arising from the unregistered nature of these ISAL groups. A key concern is the vulnerability of members' savings to fraudulent activities. She cited instances of individuals defrauding groups of substantial amounts of money and then absconding, leaving other members financially devastated and eroding trust within the community. A particularly concerning incident involved the loss of US$4,000 by one group member, an event that has understandably instilled fear and reluctance among others to participate further.

In light of these experiences, the participant strongly advocated for the formal registration of ISAL groups. She argued that registration would provide a crucial layer of protection for members' contributions through legal frameworks, dispute resolution mechanisms, and increased accountability. This formalization is essential to safeguard the financial well-being of participants, foster greater confidence in these vital community-based financial systems, and ultimately ensure their sustainability and continued positive impact on livelihoods.

4.3.3.3 Social networks

Social networks are another key factor influencing livelihood diversification strategies. These networks provide households with valuable information, resources, and support for exploring new livelihood options. The strength and extent of community ties can influence how households perceive and pursue diversification, with ratings ranging from "neutral" (3) to "somewhat important" (4). Strong social connections can facilitate the sharing of knowledge about market opportunities, new technologies, and potential employment, thereby reducing the risks and uncertainties associated with livelihood diversification. As cited by Cassidy & Barnes (2012), trust and social networks are essential for resilience, especially during shocks and disasters. Therefore, understanding the complex relationships between social networks, cultural adaptability, and livelihood capital is crucial for developing effective strategies to enhance household livelihood resilience to climate change.

4.3.3.4 Economic instability and government support

Economic instability, characterized by fluctuating market prices, unemployment, and economic downturns, can also drive households to diversify their livelihoods. Diversification becomes a crucial strategy for reducing vulnerability to these economic shocks (FAO, 2013). This factor is rated as "very important" (5), where households seek to create more stable and resilient income streams. Economic downturns limit the viability of traditional livelihoods, making diversification a necessary survival strategy. This relates to the view indicated by Moyo (2016) that in rural areas, households mostly face challenges in acquiring financial services that include credit, savings, and insurance products. Government support can significantly influence livelihood diversification through various policies, programs, and infrastructure development initiatives. Effective government interventions can create an enabling environment for households to explore and adopt new livelihood strategies. Respondents indicated the need for support in terms of providing training, facilitating market access, or investing in infrastructure that supports diversified economic activities.

4.3.3.5 Savings

Lozychenko (2021) postulated that savings emerged as a primary financial resource for many households. However, the capacity to save was significantly influenced by income levels and the frequency of climate shocks. A considerable proportion of respondents indicated that their savings were limited and often depleted rapidly during prolonged droughts or floods. The analysis revealed that only 10% of respondents reported using savings as a primary coping mechanism, mostly due to drought and hunger. The

effectiveness of savings as a buffer was further compromised by the unpredictable nature of climate shocks, making it challenging to accumulate sufficient reserves.

4.4 Chapter summary

To sum up, the data analysis highlights that the diversification of household income through engagement in off-farm activities is a critical adaptation strategy in the face of climate change in the Makotamo and Dirikwe villages in the Lowveld region. A holistic approach that integrates on-farm and off-farm strategies, coupled with supportive policies and programs, is essential for building resilient livelihoods and promoting sustainable development in this vulnerable region. Further research is needed to explore the long-term impacts of climate change on off-farm activities and to identify innovative strategies for enhancing livelihood resilience.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the research findings, which were analyzed in the previous chapter. Conclusions are drawn and recommendations made based on research findings, discussion and literature reviewed.

5.2 Summary of research findings

5.2.1 Objective 1: To explore the household's livelihood options in Makotamo and Dirikwe Village, Nyanyadzi Ward 8.

Summary of Findings:

The study identified a diverse range of livelihood options practised by households in Makotamo and Dirikwe villages. Farming (average importance score of 4.8) and Livestock Rearing (4.5) are perceived as the most important for their well-being, serving as primary sources of food and income. However, the prevalence of these climate-sensitive activities has decreased since the year 2000, with farming experiencing a significant decline from 80% to 48.9% of households engaged. Other notable livelihood options include beekeeping (3.9), fish farming (3.5), agroforestry (4.2), horticulture in irrigation schemes (4.6), craft production (3.8), and food processing (4.1). While these are considered somewhat to very important, their adoption rates have shown mixed trends since the year 2000. For instance, craft production and other livelihoods like trade/vending have seen an increase in adoption, suggesting a diversification trend. The findings highlight a shift in livelihood strategies over time, potentially influenced by the increasing impacts of climate change.

5.2.2. Objective 2: To assess the effectiveness of diverse livelihood strategies in enhancing household resilience to climate change in Makotamo and Dirikwe, Nyanyadzi Ward 8.

Summary of Findings:

The perceived effectiveness of different livelihood strategies in adapting to climate shocks varies significantly. Remittances (average effectiveness score of 4.1) are considered the most effective, followed by formal employment (3.8) and informal trade (3.5). These off-farm income sources are seen as less susceptible to the direct impacts of climate variability. Conversely, farming (2.8) is perceived as neutral to somewhat ineffective in adapting to climate shocks, highlighting the vulnerability of rain-fed agriculture.

Livestock production (3.2) and agroforestry (3.2) are considered neutral in their effectiveness. Horticulture in irrigation schemes shows high income satisfaction (4.2), suggesting its potential for resilience where water access is reliable. Overall, the findings indicate that livelihood diversification towards less climate-sensitive options plays a crucial role in enhancing household resilience.

5.2.3 Objective 3: To investigate the factors that influence the adoption of livelihood diversification strategies by households in Ward 8, Nyanyadzi.

Summary of Findings:

The results suggest that the increasing vulnerability of traditional climate-sensitive livelihoods like farming and livestock rearing to climate change (as evidenced by their decreased prevalence and lower perceived effectiveness) is a significant push factor driving the adoption of livelihood diversification strategies. The growth in off-farm activities such as craft production, trade/vending, and beekeeping indicates a strategic move by households to reduce their dependence on unreliable agricultural income. Access to resources plays a crucial role; for instance, the high income satisfaction from horticulture in irrigation schemes highlights the importance of reliable water sources for adopting high-value, climate-resilient options. Similarly, the growth of craft production, particularly among marginalized groups, suggests that the availability of local materials and market access can facilitate the adoption of non-farm livelihoods. Overall, the findings point towards climate vulnerability, resource availability, and market opportunities as key factors influencing livelihood diversification in the study area.

5.3 Conclusion

This study investigated the range of livelihood options available to households in Makotamo and Dirikwe villages, their effectiveness in building resilience against climate change, and the underlying factors influencing the adoption of diverse strategies. While traditional agricultural activities like farming and livestock rearing remain important, their declining prevalence and limited effectiveness in the face of climate shocks have driven a notable shift towards alternative income sources. The research highlights the crucial role of livelihood diversification**,** particularly into less climate-sensitive sectors such as remittances, formal employment, informal trade, beekeeping, and horticulture in irrigation schemes, in enhancing household resilience. The findings underscore that this shift is primarily influenced by increasing climate vulnerability**,** coupled with the availability of resources and market opportunities**.** Moving forward, the recommendations emphasize the need for targeted interventions that promote broader

diversification, strengthen local institutional support, facilitate access to financial resources, and enhance the climate resilience of existing livelihoods through sustainable practices and infrastructure development. This comprehensive approach is vital for bolstering the adaptive capacity and well-being of these vulnerable communities in the face of ongoing climate challenges.

This study investigated the range of livelihood options available to households in Makotamo and Dirikwe villages, their effectiveness in building resilience against climate change, and the underlying factors influencing the adoption of diverse strategies. While traditional agricultural activities like farming and livestock rearing remain important, their declining prevalence and limited effectiveness in the face of climate shocks have driven a notable shift towards alternative income sources. The research highlights the crucial role of livelihood diversification**,** particularly into less climate-sensitive sectors such as remittances, formal employment, informal trade, beekeeping, and horticulture in irrigation schemes, in enhancing household resilience. The findings underscore that this shift is primarily influenced by increasing climate vulnerability. Moving forward, the recommendations emphasize the need for targeted interventions that promote broader diversification, strengthen local institutional support, facilitate access to financial resources, and enhance the climate resilience of existing livelihoods through sustainable practices and infrastructure development.

5.4 Recommendations

5.4.1 Objective 1: To explore the household's livelihood options in Makotamo and Dirikwe Village, Nyanyadzi Ward 8.

1. **Enhance the climate resilience of existing livelihoods:**
    - Implement climate-smart agricultural practices, such as drought-resistant crop varieties, water harvesting techniques, and conservation agriculture (Thierfelder et al., 2015; Manyanhaire & Jiri, 2019).
    - Provide training and resources for farmers and livestock keepers to adapt to changing climate conditions, for example, through breeding better animal breeds that resist droughts
2. **Improve access to resources and infrastructure:**
    - Invest in infrastructure development, including improved road networks, market access, and facilitate livelihood diversification and economic opportunities.

- Strengthen social safety nets and provide access to essential services such as healthcare, education, and clean water to reduce vulnerability to climate-related shocks (Mutasa, 2015; Desalegn & Ali, 2018).

5.4.2 Objective 2: To assess the effectiveness of diverse livelihood strategies in enhancing household resilience to climate change in Makotamo and Dirikwe, Nyanyadzi Ward 8.

3. **Promote diversified livelihood options**

- Develop programs that support a wider range of livelihood options beyond traditional crop production and livestock rearing. This could include vocational training in trades, support for small businesses (Munyawarara, 2019)

- Facilitate access to resources and training for non-agricultural activities to reduce reliance on climate-sensitive sectors like sewing and baking.

4. **Promote sustainable natural resource management:**
    - Encourage livelihood diversification activities that promote sustainable use of natural resources, such as agroforestry, conservation agriculture, and sustainable harvesting practices.
    - Support community-based natural resource management initiatives to enhance environmental resilience and reduce the impact of environmental shocks.

5.4.3 Objective 3: To investigate the factors that influence the adoption of livelihood diversification strategies by households in Ward 8, Nyanyadzi.

5. **Strengthen institutional capacity and coordination:**
    - Tinarwo et al., (2018) recommended the need for enhanced capacity of local institutions and government structures to support climate change adaptation and resilience-building efforts.
    - Promote collaboration and coordination among government agencies, NGOs, community-based organisations, and other stakeholders to ensure effective implementation of resilience-building programs.
6. **Address financial constraints:**
    - Improve access to financial capital for households to invest in new livelihood activities and technologies. This could involve microfinance initiatives, credit facilities, and other financial support mechanisms (Barnett & Mahul, 2017).

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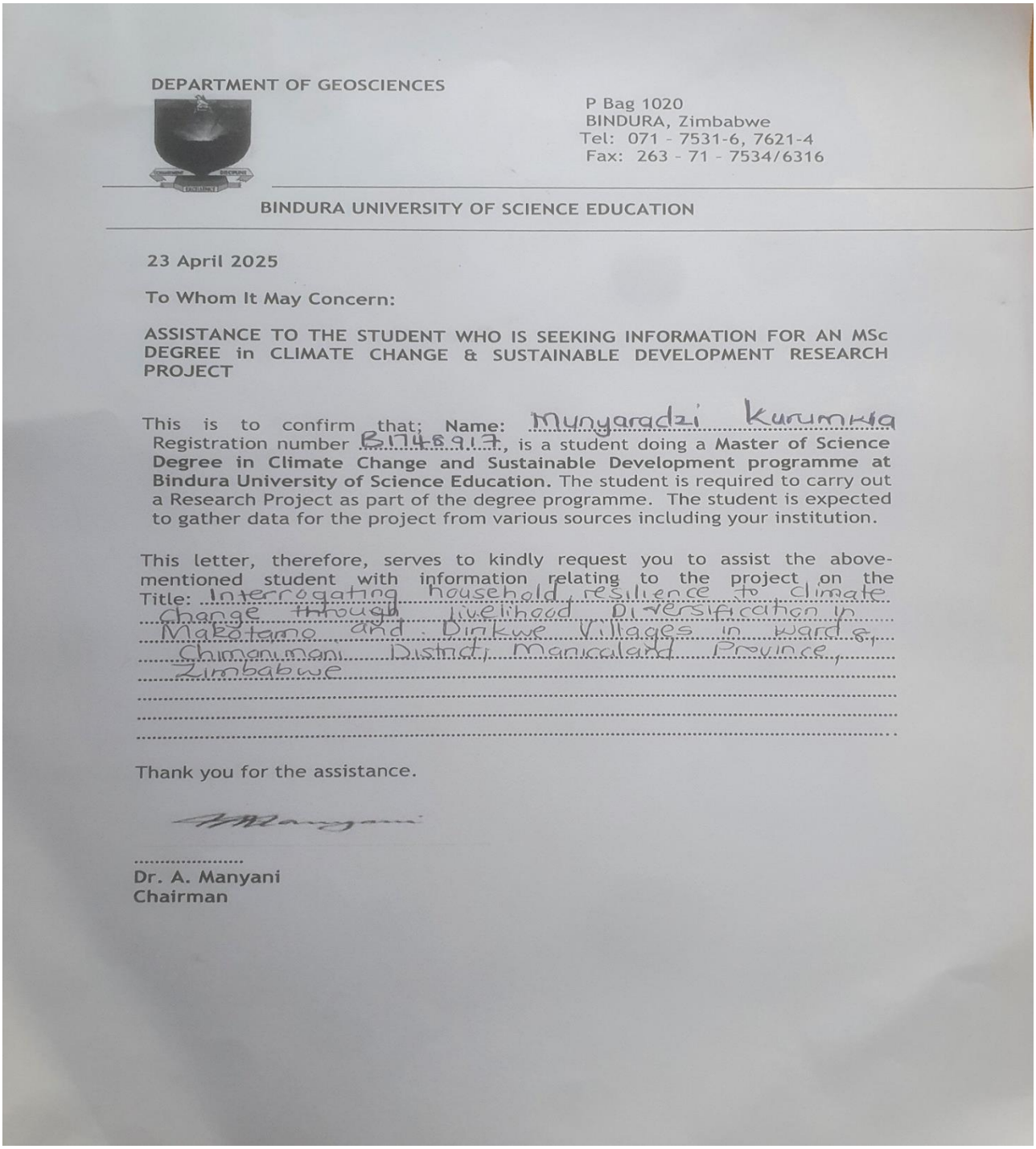
Appendices

Appendix 1: Research Assistance Letter



DEPARTMENT OF GEOSCIENCES

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BINDURA UNIVERSITY OF SCIENCE EDUCATION

23 April 2025

To Whom It May Concern:

ASSISTANCE TO THE STUDENT WHO IS SEEKING INFORMATION FOR AN MSc DEGREE in CLIMATE CHANGE & SUSTAINABLE DEVELOPMENT RESEARCH PROJECT

This is to confirm that; Name: Munyaradzi Kurumkia
Registration number B214691A, is a student doing a **Master of Science Degree in Climate Change and Sustainable Development programme at Bindura University of Science Education.** The student is required to carry out a Research Project as part of the degree programme. The student is expected to gather data for the project from various sources including your institution.

This letter, therefore, serves to kindly request you to assist the above-mentioned student with information relating to the project on the Title: Interrogating household resilience to climate change through livelihood Diversification in Mabotamo and Dinkwe Villages in ward 6, Chimanimani District, Manicaland Province, Zimbabwe

Thank you for the assistance.

.....
Dr. A. Manyani
Chairman

Appendix 2: Questionnaire for the research on Household Resilience to Climate Change Study (Respondents; farmers)

Introduction:

I am Munyaradzi Kurumwa, a final-year student studying Master of Science in Climate Change and Sustainable Development at Bindura University of Science Education. I am conducting research titled "Interrogating Household Resilience to Climate Change through Livelihood Diversification in Makotamo and Dirikwe Villages in Ward 8, Chimanimani District." The purpose of this study is to explore how households in Makotamo and Dirikwe villages have diversified their livelihoods to adapt to climate change and identify strategies that have enhanced their resilience. The information gathered will be useful for policymakers, development agencies, and community members seeking to improve climate change adaptation and resilience efforts. All responses you provide will be kept strictly confidential. Participation in this research is voluntary, and you are free to withdraw at any time.

SECTION A: Demographic information (tick where appropriate)

1. Gender.

Male ☐ Female ☐

2. Age (years)

a) 20-30 ☐ b) 31-40 ☐ c) 41-50 ☐ d) 51 -60 ☐ e) 61 -70 ☐

3. Marital status.

a) Single ☐ b) Married ☐ c) Divorced ☐ d) Widowed ☐

4. Household size.

a) 1-4people ☐ b) 5-8people ☐ c) Above 8 ☐

5. Educational level.

a) Primary ☐ (b) Secondary ☐ (c) Tertiary ☐ (d) None ☐

6) Indicate the main occupation(s) of the head of household?

……

……

Section B: Household livelihood options in Makotamo and Dirikwe Village, Nyanyadzi Ward 8

7. Please complete the table below by indicating the on-farm and off-farm activities your household was engaged in for the period before and after the year 2000 to the present.

Livelihood practice	**Before the year 2000**	**Yes/No**	**From the year 2000 to the present**	**Yes/No**
a) Crop farming	(List the crop(s) and the varieties) a) b) c) d) e)		(List the crop(s) and the varieties) a) b) c) d) e)	
b)Livestock rearing	Name(s) of livestock a) b) c) d) e)		Name(s) of livestock a) b) c) d) e)	
b) Beekeeping	List the number of hives and the type a) b) c) d)		List the number of hives and the type a) b) c) d)	
c) Fish farming	Number of fish ponds and type of fingerlings stocked i. ii iii		Number of fish ponds and type of fingerlings stocked i. ii iii	
d) Agroforestry	Types and number of trees grown i. ii iii		Types and number of trees grown i. ii iii	
e) Horticultural	Types of vegetables grown i. ii iii		Types of vegetables grown i. ii iii	

f) Craft production	List of craft work being done 1 2 3		List of craft work being done 1 2 3	
g) Food Processing	List of products processed 1 2 3		List of products processed 1 2 3	
h) Herbal Medicine production	Types of herbs grown 1 2 3		Types of herbs grown 1 2 3	

8. How important is each of the above-mentioned livelihood strategies to your household's overall well-being? (Likert scale: 1-5, where 1 is "not important at all" 2. “Somewhat important” 3. “Neutral” 4. “Somewhat important” and 5 is "very important")

Livelihood activity	Level of importance				
	1	2	3	4	5
Farming					
Livestock production					
Formal employment					
Informal trade					
Remittances					
Other (please specify)					

9) Fill in the following table highlighting how satisfied you are with the income generated from each of the following livelihood strategies. (Likert scale: 1. “very dissatisfied” 2. “Somewhat dissatisfied” 3. “Neutral” 4. “Somewhat satisfied” 5. "Very satisfied") **Tick where applicable**

Livelihood activity	Level of satisfaction

	1	2	3	4	5
Farming					
Livestock production					
Formal employment					
Informal trade					
Remittances					
Other (please specify)					

10) How likely are you to continue using each of the following livelihood strategies in the next 5 years? (Likert scale: 1-5, where 1 is "not likely at all" 2. “Unlikely” 3. “Neutral” 4. “Likely” 5 is "very likely"

Livelihood activity	Likelihood to continue with the activity in the next 5 years				
	1	2	3	4	5
Farming					
Livestock production					
Formal employment					
Informal trade					
Remittances					
Other (please specify)					

11) How effective do you think your current livelihood strategies are in adapting to climate-related shocks? (Likert scale: 1-5, where 1 is "not effective at all" 2. “Somewhat ineffective” 3. “Neutral" 4. “Somewhat effective” 5. "Very effective")

Tick where applicable

1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐

12) Have you ever considered changing your livelihood strategy entirely in response to climate-related shocks? (Yes/No)

Tick where applicable

1. Yes ☐ No. ☐

13) What financial resources do you have to fall back on in times of climate-related shocks? (Select all that apply)

- Savings
- Credit
- Insurance
- Remittances
- Other (please specify)

……
……

14a) Have you diversified your livelihoods in the past 20 years? (Yes/No)

Tick where applicable

Yes. ☐ No. ☐

b) If yes, what motivated you to diversify your livelihoods? (Select all that apply)

- Climate-related shocks
- Economic instability
- Social networks
- Access to credit
- Other (please specify)

Section 3: Factors Influencing Adoption of Livelihood Diversification

15) How important are the following factors in influencing your decision to adopt livelihood diversification strategies? ((Likert scale: 1-5, where 1 is "not important at all" 2. “Somewhat important” 3. “Neutral” 4. “Somewhat important” and 5 is "very important")

Insert the number for the level of scale

- Climate-related shocks ☐
- Access to credit ☐
- Social networks ☐
- Economic instability ☐
- Government support ☐
- Other (please specify) and state the level of importance

……
……

16) Have you received any training or support from government or non-governmental organizations on livelihood diversification? (Yes/No)

Tick where applicable

Yes. ☐ No. ☐

17) How effective do you think government policies and programs are in supporting livelihood diversification? (Likert scale: 1-5, where 1 "not effective at all" 2. “Somewhat ineffective” 3. “Neutral" 4. “Somewhat effective” 5. "Very effective")

Tick where applicable

1. ☐ 2. ☐ 3. ☐ 4. ☐ 5. ☐

Thank you for participating in this research.

Appendix 3: Interview Guide for Household Resilience to Climate Change Study specifically for AGRITEX Officer, Environmental Management Agency Representative, Councilor and Village Heads

Introduction:

My name is Munyaradzi Kurumwa, a final-year student studying Masters of Science in Climate Change and Sustainable Development at Bindura University of Science Education. I am conducting a study titled "Interrogating Household Resilience to Climate Change through Livelihood Diversification in Makotamo and Dirikwe Villages in Ward 8, Chimanimani District." The purpose of this study is to explore how households in Makotamo and Dirikwe villages have diversified their livelihoods to adapt to climate change and to identify strategies that have enhanced their resilience. Your participation in this study will contribute valuable insights into how households in this region are responding to climate change. The information gathered will be useful for policymakers, development agencies, and community members seeking to improve climate change adaptation and resilience efforts. All responses you provide will be kept strictly confidential. Participation in this research is voluntary, and you are free to withdraw at any time.

1. What are the main livelihood activities that households in Makotamo and Dirikwe engage in?

2. Can you describe each of these livelihood activities in more detail?

3. How have those household livelihood activities changed over the past 20 years?

4. What are the main challenges that household faces in terms of livelihoods?

5. Can you give examples of specific livelihood strategies that have been effective in enhancing a household's resilience to climate change?

6. How do you think household livelihood strategies could be improved to better enhance resilience to climate change?

7. Is livelihood diversification useful in enhancing household resilience to climate change?

8. What factors do you think influence a household's decision to adopt livelihood diversification strategies in Dirikwe and Makotamo?

9. How do you think climate change has affected household's livelihoods?

10. Are there any additional support or resources that you think would help households to better adapt to climate change?

11. Do you have any suggestions for how to improve livelihoods and enhance resilience to climate change in Makotamo and Dirikwe Village, Nyanyadzi Ward 8?

THANK YOU

Appendix 4: FGD interview Guide for Household Resilience to Climate Change Study for farmers

Introduction:

My name is Munyaradzi Kurumwa, a final-year student studying Masters of Science in Climate Change and Sustainable Development at Bindura University of Science Education. I am conducting a study titled "Interrogating Household Resilience to Climate Change through Livelihood Diversification in Makotamo and Dirikwe Villages in Ward 8, Chimanimani District." The purpose of this study is to explore how households in Makotamo and Dirikwe villages have diversified their livelihoods to adapt to climate change and to identify strategies that have enhanced their resilience. Your participation in this study will contribute valuable insights into how households in this region are responding to climate change. The information gathered will be useful for policymakers, development agencies, and community members seeking to improve climate change adaptation and resilience efforts. All responses you provide will be kept strictly confidential. Participation in this research is voluntary, and you are free to withdraw at any time.

1. What are the main livelihood activities that household members engage in?

2. How do you think climate change has affected household's livelihoods?

3. What strategies do you use to cope with climate-related shocks, such as droughts or floods?

4. How do you think livelihood diversification can help households in the community to become more resilient to climate change?

5. What factors do you think influence a household's decision to adopt livelihood diversification strategies?

6. Can you share examples of successful livelihood diversification strategies that you have seen or experienced in our community?

7. Are there any specific challenges or barriers that households in our community face when trying to adopt livelihood diversification strategies?

Thank you for participating in this research.