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Title

EXPLORING THE SIGNIFICANCE OF CROP DIVERSITY IN RESILIENCE TO CLIMATE CHANGE IMPACTS AMONG SMALL SCALE FARMERS IN MAKANGA VILLAGE

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ABSTRACT

Climate change poses a significant threat to agricultural livelihoods in Malawi, particularly for small-scale farmers who depend largely on rain-fed farming systems. Erratic rainfall patterns, prolonged droughts, soil degradation, and declining crop yields have increasingly undermined food security and household livelihoods in rural communities. This study explored the significance of crop diversity in enhancing resilience to climate change impacts among small-scale farmers in Makanga Village, Malawi.

The study adopted a descriptive qualitative research design and was conducted in Makanga Village, a climate-vulnerable rural community. Data were collected through semi-structured interviews using open-ended questionnaires administered to small-scale farmers, community leaders, and selected community members. Purposive sampling was used to select participants with relevant farming experience and knowledge of climate change impacts. The collected data were analyzed thematically to identify key patterns and insights related to food security, livelihoods, and adaptive farming practices.

The findings revealed that climate change has significantly affected agricultural productivity in Makanga Village through unpredictable rainfall, droughts, and declining soil fertility, resulting in low crop yields, food shortages, and reduced household income. The study found that crop diversification practices such as crop rotation, intercropping, and the inclusion of drought-tolerant crops like cassava and legumes played a crucial role in enhancing household resilience. Farmers practicing crop diversity reported improved food security, increased income opportunities, better soil health, and reduced risk of total crop failure. Community leadership was also found to be important in promoting adaptive practices through local mobilization, knowledge sharing, and support initiatives.

CHAPTER 1

INTRODUCTION

Introduction

Crop diversity originally stems from the philosophy of agrobiodiversity, also known as agriculture diversity. Upon observation and educational based field work, extensions and internship a discovery of a gap needed to be filled has been brought to light. Crop diversity is a buffer against the impacts of extreme weather events and changing climate patterns.
This is the very nature of this project, this proposal, it aims to enable the existing systems to enable Makanga community to fend for itself presently and futuristically. Henceforth, this chapter outlines the background information, statement of the problem, main objective, specific objectives, research questions, significance of the study and the layout for the research report.

Background of the study

Climate change has become one of

the most critical challenges facing Malawi, a country highly dependent on agriculture and natural resources. Maize is the dominant crop in Malawi, accounting for approximately 57% of the total cultivated land and serving as the main staple food for over 80% of the population (Dorward et al., 2008). However, Malawi's agriculture is mostly rain-fed and highly vulnerable to climate variability. Over recent decades, the country has experienced increasing temperatures, erratic rainfall patterns, and more frequent extreme weather events such as droughts and floods, which severely impact maize production and food security.

Climate resilience in Malawi involves the capacity of communities, especially smallholder farmers, to anticipate, prepare for, and respond to climate-related shocks. The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) highlights that resilience building requires integrated approaches combining improved agricultural practices, diversified livelihoods, and strengthened local institutions (Thornton et al., 2017). In Malawi, strategies such as adopting drought-tolerant maize varieties, practicing conservation agriculture, and improving water harvesting have shown promise in helping farmers cope with changing weather patterns and reduce crop failure risks. These practices not only improve productivity but also enhance soil health and biodiversity, contributing to long-term sustainability (Mungai et al., 2020).Moreover, CCAFS research stresses the importance of climate information services and participatory approaches in building resilience. Access to timely and accurate weather forecasts allows farmers to make informed decisions about planting and harvesting times, reducing vulnerability to unpredictable rainfall (CCAFS, 2019). Participatory methods involving farmers in the design and implementation of adaptation strategies ensure that local knowledge and needs shape climate interventions, making them more effective and culturally appropriate (Van Asten et al., 2020). However, barriers such as limited access to technology, financial constraints, and weak institutional support still hinder widespread adoption of these resilience-building measures in Malawi. Addressing these challenges requires coordinated efforts from government agencies, NGOs, researchers, and communities to create an enabling environment for climate-smart agriculture and resilient livelihoods.

Furthermore, studies have shown that shifting climate patterns in Malawi have led to reduced crop yields, especially for maize, which is highly sensitive to drought and unpredictable rainfall (Bryan et al., 2013, *Global Environmental Change*). This results in food shortages, income loss, and increased poverty for smallholder farmers who rely on maize for both sustenance and livelihood (Ngwira et al., 2014, *Climate and Development*). Additionally, climate change contributes to soil degradation, loss of biodiversity, and greater incidences of

pests and diseases, further threatening agricultural productivity and the environment (Mkwambisi & Tengö, 2016, *African Journal of Ecology*).

Malawi has adopted various climate adaptation strategies such as promoting drought-resistant crop varieties, improving water management, and supporting community-based natural resource management. However, these efforts face challenges including limited financial resources, poor infrastructure, and lack of access to climate information (Chidanti-Malunga et al., 2016).

From a social work perspective**,** understanding climate change impacts is crucial because the resulting food insecurity, poverty, and displacement affect vulnerable populations, including women, children, and the elderly. Social workers play an important role in building community resilience, facilitating access to social protection programs, and advocating for policies that address the social dimensions of climate change. By linking climate adaptation with social support systems, social work contributes to sustainable development and improved wellbeing for Malawi's most affected communities.

Problem Statement

Malawi faces serious challenges from climate change, such as unpredictable rainfall and frequent droughts, which threaten the livelihoods of many smallholder farmers. Despite efforts to build resilience through climate-smart farming practices and improved access to weather information, many communities still struggle to adapt effectively. Limited resources, poor infrastructure, and lack of support make it difficult for vulnerable groups to cope with climate impacts. This situation puts food security and sustainable development at risk, highlighting the need to better understand and address the barriers to building strong climate resilience in Malawi.

Climate change poses a great threat to the sustainability of the Malawian people, their food security and development. It has led to unseasonal rainfall, floods, droughts and even soil PH imbalance and as such has rendered the farming system of one crop practice null and void.

Research Objectives

Main Objective

To find out the significance of crop diversity to small-scale farmers in resilience to climate change.

Specific Objectives

To explore the food security issues arising due to climate change impacts

To identify how impacts of low yields have affected households

To find out how crop diversification can improve the community's livelihood and

development

Research Questions

What are the root causes of climate change impacts in Makanga community?

How does crop diversification influence the resilience of smallholder farmers to climate change in Malawi?

How do community leaders step in in the mitigation of climate change impacts?

In what way does the community contribute to the sustenance of crops despite climate change impacts?

Which form of governance helps mitigate climate change impacts, is it the parliament members, ombudsman?

Significance of the study

The research aims to assess the importance of crop diversity to small-scale farmers in resilience to climate change. This study is not only academically valuable it has real-world impact. It supports the transformation of vulnerable agricultural systems into more resilient, diverse, and sustainable livelihoods for millions facing the frontline effects of climate change.

Additionally, this study will empower local farmers to be more innovative via climate-smart agriculture smart and thereby conserving the environment and making great financial progress.

structure of the report

Chapter 1: Introduction

Clearly gave the introduction and background of the study, problem statement, research objectives and research questions, significance of the study, structure of the report as well as the chapter summary.

Chapter 2: Literature Review

This chapter presented the literature review in line with specific objectives which included empirical evidence, definition of terms, theoretical framework and chapter summary. The study used books, journals and internet as well as magazines to obtain information.

Chapter 3: Research Methodology

The chapter presented research design and the research method that was used in the study. The study described the study area, research setting, target population, sample size and sample technique. It also discussed instrument of data analysis as well as the pilot study.

Chapter 4: Results and Discussion

This chapter presented the findings, discussion and interpretations of the study. The findings was analyzing data using content analysis.

Chapter 5: Conclusion and recommendation

This chapter has given a summary of findings of the study, conclusion drawn from the study and the recommendation of the study.

Chapter Summary

This chapter has explained about the introduction, background of the

study, problem statement, research objectives, research questions, significance of the study, structure of the report and the chapter summary.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter analyzes existing literature on the role of crop diversity in enhancing the resilience of small-scale farmers to climate change, particularly focusing on root and tuber crop such as cassava, sweet potatoes and their function in climate smart agriculture. The review aligns with the study's key objectives: Identifying climate change impacts, evaluating crop diversification benefits, understanding household level impacts of low yields and exploring community level mitigation efforts. It also integrates definitions of relevant technical terms to provide clarity and contextual grounding. It is supported by various theories and scholars of thought which help relate this research with the social work field.

Definition of terms

Crop Diversity

Crop diversity refers to the variety and variability of crop species and cultivars grown within an agricultural system, including genetic, species, and management diversity. It enhances ecosystem stability, reduces climate-related risks, and supports sustainable agricultural production (Kremen & Miles, 2015; Isabell et al., 2017).

Climate Change

Climate change denotes long-term alterations in temperature, precipitation patterns, and the frequency and intensity of extreme weather events, largely driven by anthropogenic greenhouse gas emissions, with significant consequences for agriculture and rural livelihoods (IPCC, 2021).

Climate Resilience

Climate resilience is the capacity of social, ecological, and agricultural systems to anticipate, absorb, adapt to, and recover from climate-related shocks while maintaining essential functions and structures (Folke et al., 2016).

Small-Scale Farmers (Smallholder Farmers)

Small-scale farmers are agricultural producers operating on limited landholdings, primarily using family labor and low external inputs, whose livelihoods depend largely on subsistence and small-market-oriented farming (Lowder, Skoet, & Raney, 2016).

Food Security

Food security exists when individuals and households consistently have physical and economic access to sufficient, safe, and nutritious food that meets dietary needs and supports a healthy and productive life (Béné et al., 2015).

Agrobiodiversity (Agricultural Biodiversity)

Agrobiodiversity refers to the

diversity of crops, livestock, and associated species within agricultural systems that support ecosystem functions, food production, and resilience to environmental stress (Zimmerer et al., 2019).

Monoculture

Monoculture is an agricultural practice involving the repeated cultivation of a single crop species on the same land, often increasing vulnerability to pests, diseases, and climate variability due to reduced biological diversity (Duru et al., 2015).

Polyculture

Polyculture is a farming system in which multiple crop species are grown together in the same field, enhancing biodiversity, improving soil health, and increasing resilience to climatic and environmental stressors (Tamburini et al., 2020).

Crop Rotation

Crop rotation is the systematic cultivation of different crops in succession on the same land to improve soil fertility, reduce pest and disease pressure, and enhance long-term productivity (Gaudin et al., 2015).

Genetic Diversity

Genetic diversity refers to the variation of genetic traits within and between crop species, which enhances adaptability to drought, pests, diseases, and other climate-related stresses (Dwivedi et al., 2016).

Livelihood

A livelihood comprises the capabilities, assets, and activities required for a means of living and is considered sustainable when it can cope with and recover from stresses and shocks without undermining future opportunities (Scoones, 2015).

Climate-Smart Agriculture

Climate-smart agriculture refers to agricultural practices and systems that sustainably increase productivity, enhance resilience to climate change, and reduce vulnerability to climate risks (Lipper et al., 2018).

Soil Degradation

Soil degradation is the decline in soil quality caused by physical, chemical, or biological processes such as erosion, nutrient depletion, and mismanagement, leading to reduced agricultural productivity and ecosystem function (Montanarella et al., 2016).

Empirical Evidence

Root Causes of Climate Change in Makanga Village

Greenhouse gas emissions from farming are one of the main causes of climate change. This problem is common in rural areas, where many farmers still use old and unsustainable farming methods. The Intergovernmental Panel on Climate

Change (IPCC, 2022) explains that harmful gases like carbon dioxide, methane, and nitrous oxide are released when farmers burn crop remains, use too much fertilizer, and manage land poorly. In a place like Tungulule, most people depend on traditional farming, and they often cut down trees for firewood or to clear land for farming.

These actions damage the environment and make climate change worse. On top of that, changing rainfall and rising temperatures mainly caused by people using fossil fuels are already affecting how much food can be grown. Taalas (2023), the Secretary General of the World Meteorological Organization, called this situation "global boiling," warning that countries like Malawi, which don't have strong systems to deal with climate change, are in danger of facing extreme heat and dangerous weather that threaten people's lives and food supply.

Challenges Faced Due to Climate Impacts on Small-Scale Farmers

Small-scale farmers in Makanga village are increasingly struggling due to the growing effects of climate change. These farmers depend heavily on rain-fed agriculture, which makes their farming activities highly vulnerable to changes in weather patterns. The Food and Agriculture Organization (FAO, 2021) highlights that unpredictable rainfall, long periods of drought, and sudden flash floods are now common in many parts of Malawi. These extreme weather events disrupt the farming calendar, making it hard for farmers to plant or harvest their crops at the right time. As a result, crop yields have gone down, making it difficult for households to get enough food or earn a stable income. This situation is pushing many rural families into deeper poverty, especially in areas like Makanga village where farming is the main source of livelihood.

In addition, research by Dorward et al. (2008) shows that, despite government efforts to support agriculture through subsidies like cheap fertilizers, maize production in Malawi has remained low for years. One major reason for this is the country's overdependence on maize as the main crop. Most farmers grow maize only, a practice known as monoculture. While maize is a staple food, relying on it alone is risky, especially in a changing climate. If the maize crop is affected by drought, pests, or diseases, there are often no other crops to rely on for food or income. This increases the risk of hunger and food insecurity in communities like Makanga. To address these challenges, there is a need to support crop diversification, promote climate-resilient farming methods, and help farmers adapt to changing environmental conditions.

Mitigation Methods Used Against Climate Change

Farmers in Malawi, including those in rural areas like Makanga use different farming practices to reduce the negative effects of climate change. One of the most helpful strategies they are using is crop diversification, which means planting different types of crops

instead of depending on just one. According to Pellegrini and Tasciotti (2014), growing a mix of crops helps farmers reduce risk, keep the soil healthy, and improve the amount and variety of food available for families. This is especially important when the weather becomes unpredictable, as it often does due to climate change.

Some of the methods used in crop diversification include crop rotation (planting different crops in the same field in different seasons) and intercropping (planting several types of crops
together at the same time). These techniques help prevent pests and diseases from spreading too easily, reduce the need for chemical inputs, and help the soil hold more water, which is very important during dry seasons. Research by Kambewa et al. (2018) supports these ideas, showing that farmers who grow crops like maize together with cassava and legumes are more likely to have food even during periods of drought.

These practices make farming more resilient, meaning farmers can better survive tough conditions. Even if one crop fails due to poor rainfall or pests, the other crops may still grow and be harvested, helping households to have food and income. This approach not only helps farmers adapt to climate change but also improves food security in their communities.

Community Leaders' Role in Mitigation

Community leadership is very important when it comes to making climate change adaptation strategies successful, especially in rural areas like those in Malawi. Local leaders such as village chiefs, religious figures, and traditional authorities play a big part in helping people accept and use new farming methods. According to Mloza-Banda (2005), projects that are led by the community, like backyard gardens and sharing seeds among households, have become more popular because of strong guidance from local leaders. These projects are important because they give people extra food and help bring the community together to work toward common goals.

Green (2009) also points out that including community leaders in climate-related programs helps build trust between the government or organizations and the people. This trust is important because it makes it easier for useful information, farming advice, and resources to reach small-scale farmers. In addition, these leaders help organize how land is used, support tree planting to reduce deforestation, and encourage people to use water wisely. These activities are very helpful in building stronger and more resilient communities, like those in Tungulule, who are facing the effects of climate change.

Theoretical Framework

This research is based on two important frameworks: the Sustainable Livelihood Framework (SLF) and the Human Development Index (HDI), which was introduced by the United Nations. The HDI is used to measure how developed a country is by looking at key areas such as education, health, and income. When it

comes to crop diversity, this theory is helpful because it shows how growing a variety of crops can improve food security, raise household incomes, and lead to better health. When families have access to different kinds of food, they are more likely to eat balanced meals, which helps them stay healthy and live longer lives.

The Sustainable Livelihood Framework (SLF) helps us understand how rural people make a living, especially in the face of challenges like climate change. It looks at five types of assets that people need to survive and improve their lives: natural (like land and water), human (like skills and knowledge), social (like community support), financial (like income and savings), and physical (like tools and infrastructure). Crop diversification, such as planting cassava along with other crops, supports these assets by making food supplies more stable, reducing risks from climate shocks, and giving farmers more ways to earn a living. This makes their way of life more sustainable and helps them better cope with the impacts of climate change.

The Sustainable Livelihood Framework (SLF) and the Human Development Index (HDI) both help to explain how crop diversity strengthens resilience to climate change. The HDI focuses on key areas such as education, health, and income. Growing a variety of crops improves food security by ensuring families have access to different types of food, which leads to better nutrition and health outcomes. It also gives farmers more opportunities to earn income by selling various crops, and it promotes learning through the adoption of new farming techniques. On the other hand, the SLF highlights five types of assets natural, human, social, financial, and physical that people use to maintain and improve their livelihoods. Crop diversification supports these assets by protecting soil and water resources (natural assets), helping farmers gain new knowledge and skills (human assets), encouraging community support through seed sharing and collaboration (social assets), increasing household income (financial assets), and improving the use of land and farming tools (physical assets). Together, these benefits make rural households more capable of adapting to the negative effects of climate change, reducing their vulnerability and helping them build a more stable and sustainable future.

Chapter Summary

This chapter has explained important terms like crop diversity, agrobiodiversity, and climate- smart agriculture to help build a clear understanding of how growing different types of crops can improve food security, especially in areas affected by climate change. The reviewed studies show that root and tuber crops such as cassava and sweet potatoes are especially important in helping communities become more resilient to changing weather patterns. By connecting the reviewed literature to the study's main objectives, the chapter has shown that crop diversification, including

practices like growing multiple crops together (polyculture), using improved crop varieties (hybrids), and encouraging leadership involvement, can help smallholder farmers in places like Makanga village respond better to climate challenges. However, the chapter also points out some weaknesses in how these strategies are used. For example, many farmers still rely heavily on maize and other less resilient crops, which makes it difficult to fully benefit from the advantages of crop diversity. This continued dependence suggests a need for stronger efforts to promote and support diverse farming systems in areas that are vulnerable to climate change.

CHAPTER 3: RESEACH METHODOLOGY

Introduction

This chapter explains how the research was carried out. It describes the overall design of the study, where the research took place, who was involved, how the participants were selected, the tools used to collect data, and how the data was analyzed. The chapter also outlines how the research followed ethical guidelines and how a small pilot study was done to test the tools before the main data collection. All these steps help ensure that the research was done in a proper, fair, and reliable way.

Research Design and Methodology

This study used a descriptive qualitative research design. This means it focused on collecting detailed information from the people involved to understand their experiences and views on crop diversity and climate change. The qualitative approach was suitable because the research aims to explore how small-scale farmers in Makanga adapt to climate change and use crop diversity in their daily farming. It allows the researcher to get deep insights into their challenges, coping strategies, and the role of community leaders and members in climate resilience. Every detail recorded, collected, analyzed and understood was used to make the research viable to those seeking guidance on such topics.

Research Setting

The research took place in Makanga Village, in area 54 opposite sun seed manufacturing company, a rural area in Malawi that relies heavily on farming for survival. The village was chosen because it represents one of many main climate-vulnerable communities in Malawi. Farmers in this area face serious climate-related challenges, such as poor rainfall, drought, and low crop yields, which makes it an appropriate location for this kind of study.

Target Population

The target population for this study included small-scale farmers, village leaders, and other nearby community members in and out of Makanga village. These groups are important because they are directly involved in farming activities and community development. They also play key roles in promoting or practicing crop diversification and responding to climate change impacts.

Sampling Technique

The study used purposive sampling, which means selecting people who have knowledge or experience related to the research topic. This technique helped the researcher choose individuals who gave meaningful and relevant information about crop diversity, farming challenges, and climate change adaptation in the village.

Sample Size

The study included a total of 20 participants, consisting of 10 smallholder farmers (both men and women), 3 community leaders or village elders, and 2 external community members. Although the sample size was relatively small, it has proven appropriate for a qualitative study, as it allowed for the collection of rich, detailed information. This manageable number also enabled the researcher to focus on the quality of the responses rather than the quantity, ensuring in-depth understanding of the issues being studied.

Research Instrument

The main tool for data collection were semi-structured interviews. These are interviews that use guiding questions but allow people to speak freely and explain their thoughts in detail. A series of 15 questinnaires with open-ended questions was prepared. The questions focused on topics like crop choices, climate challenges, farming methods, and community support systems.

3.1 Pilot Study

Before the full research began, a pilot study was conducted with 2 participants from a nearby village. This small test helped check if the interview questions are clear and useful. Any confusing questions were improved before starting the actual interviews. This step was important in avoiding mistakes and improved the quality of the final data.

Data Analysis

After collecting the interview data, the researcher used thematic analysis to examine it. This method involved reading through the responses, identifying common topics (themes), and organizing the information into categories. These themes helped explain how people view crop diversity and how could helped them deal with climate change. The findings will be linked to the research objectives and the literature reviewed in Chapter 2.

Ethical Consideration

This research strictly followed ethical guidelines to protect the rights and well-being of all participants. Informed consent has been obtained from everyone taking part in the study, and their identities have been kept confidential by not using real names, they are referred to as “respondent.” Participants have had the freedom to withdraw from the study at any time without any consequences. The researcher also made sure that no harm or discomfort was caused during the interviews. In addition, permission to conduct the study has been sought from both the village authorities and the university to ensure full

compliance with local and institutional requirements.

Chapter Summary

This chapter has described how the research has been conducted to explore the role of crop diversity in building resilience to climate change in Makanga village. It outlined the use of a qualitative design, purposive sampling, and interviews as the main method of data collection. It also discussed the importance of a pilot study, the steps for analyzing the data, and the ethical measures to protect participants. These procedures are designed to make sure that the research is carried out in a responsible and trustworthy way.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter presents the results and discussion of the study titled "Exploring the significance of crop diversity in resilience to climate change impacts to small scale farmers in Makanga village." The chapter includes the response rate and demographic information of the participants, and a detailed presentation of the findings arranged according to the three research objectives.

Response Rate

A total of 15 respondents participated in the study, consisting of small-scale farmers, village leaders, and other nearby community members. The total response rate of 75%, which is considered a justifiable and satisfactory percentage for this type of research.

Demographic Information

This contains the prolific data of the participants. This includes their age, income source, highest level of education and location. This information has been expanded to understand

them and also how their experiences influence outcomes of the climate change impacts in their livelihoods.

Age of Respondents

The age of small scale farmers was included in this study because age determines adaptability and experience the farmers have to the uncontrollable shift in climate patterns that continue to Makanga village.

Table 1. Age of small scale farmers

Age Range	Frequency	Frequen
19-24	4	26.6%
25-30	8	53.3%
30 above	4	26.6%
Total	15	106.5 %

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The table above shows that the majority of the small scale farmers were between the age of 25 to 30. While a similar percentage follows among the ages of 19 to 24 and 30 above. Hence the farmers at the ages of 25 to 30 are the ones with most experience and adaptability.

Level of education

This demographic information describes the level of education that the respondents attained. It is relevant to this research study because it shows the level of literacy of the respondents and ability to articulate their experience and feelings related to crop diversity as a mitigation tactic against climate change impacts

Table 2: Level of education for small scale farmers

The table above, respectfully indicates that the majority of small scale farmers attained primary level of education, while the remaining 20% and 6.7% attained secondary and none.

Presentation of Research Findings

This presents on validating the specific research objectives and outlining each and every theme from research questions. It has included how the respondents understood the research, how it impacted them and in so doing shed light on the findings as the researcher engaged on the actual ground.

To explore the food security issues arising due to climate change impacts

What are the root causes of climate change impacts in Makanga community?

Respondents repeatedly emphasized that rainfall no longer comes at the expected time, disrupting farming calendars. Farmers explained that they prepare their fields but rains arrive late or inconsistently, leaving seeds to dry out. One respondent said, *"our community, in the past, rain used to come properly at its appropriate season but now it is very difficult to fall here."* This irregularity has made it difficult to plan planting and harvesting, leading to crop failure.

These lived experiences align with the findings of Chingala et al. (2017), who observed that Malawian farmers perceive climate change primarily through shifts in rainfall patterns, noting that unpredictable rains undermine traditional farming schedules and crop productivity.The respondents' accounts of seeds drying out before rains arrive reflect the broader evidence that climate variability directly reduces yields and increases the risk of food insecurity. Another respondent said, *"sometimes we farm early but instead of positive results, we got negative ones because the soil dried out before the rains come, even when we expected it to rain"*

Prolonged Dry Spells and Droughts

Community members described long dry periods that reduce soil moisture and fertility, making it impossible for crops to grow well. They noted that maize, the staple crop, suffers the most because it requires consistent rainfall. Respondents explained that these dry spells often result in poor harvests and hunger. One farmer shared, *"because of the shift in climate we have been affected in terms of harvesting very little maize. This has brought problems of hunger in our family."* These experiences are consistent with Mungai et al. (2020), who found that prolonged droughts in Malawi reduce soil health and crop productivity, leaving households vulnerable.

To Explore the Food Security Issues Arising Due to Climate Change Impacts
Which crops are most affected by climate change in your community?
Respondents explained that maize is the most affected crop, as it requires consistent rainfall and is highly vulnerable to drought.

Farmers noted that when maize fails, households face immediate hunger because it is the staple food. One respondent said, *"maize is the one that suffers most, when rains delay, we harvest nothing."* This observation is consistent with Bryan et al. (2013), who highlight that maize is extremely sensitive to rainfall variability, making it a risky crop under climate change. Since maize dominates household diets, its vulnerability directly links climate variability to food insecurity, underscoring the need for crop diversification as a resilience strategy.

To identify how impacts of low yields have affected households

How does crop diversification influence the resilience of smallholder farmers to climate change in Malawi?

Food Insecurity and Nutritional Deficiencies

Respondents explained that declining yields have led to reduced meal frequency and poor dietary diversity. Families reported eating only once a day, with children and the elderly most affected. One respondent said, *"we used to eat three times a day, but now we only eat once, and sometimes we sleep hungry."* This shows how food insecurity directly undermines household wellbeing.Scholarly evidence supports this reality. Kremen & Miles (2015) argue that crop diversity enhances ecosystem stability and food availability, reducing the risk of hunger during climate shocks.

Economic Strain and Livelihood Disruption

Respondents noted that low yields reduced income from crop sales, making it difficult to afford school fees, medical care, or farm inputs. Many households resorted to borrowing or sending youth to urban centers for work, leaving women and the elderly to manage farms under worsening conditions. This aligns with Pellegrini & Tasciotti (2014), who found that diversified farming systems reduce economic vulnerability by spreading risk across multiple crops.

How do low yields affect household income and survival strategies?

Respondents reported that reduced harvests limit their ability to sell crops, forcing families to borrow money or migrate to urban areas for work. Women and the elderly are left to manage farms under worsening conditions. One farmer explained, *"when we harvest little, we cannot sell, so we borrow or send our children to town."* This finding resonates with Pellegrini and Tasciotti (2014), who show that households relying on single crops face severe income instability, while diversification spreads risk and supports survival strategies. This demonstrates that low yields not only reduce food availability but also destabilize household economies, making diversification central to resilience and livelihood security.

To find out how crop diversification can improve the community's livelihood and development

How do community leaders step

in in the mitigation of climate change impacts? Mobilization and Collective Action

Respondents emphasized that chiefs and local leaders mobilize households to adopt adaptive practices such as backyard gardens, seed sharing, and tree planting. One respondent explained, *"our chief encourages us to plant trees and share seeds so that no one is left behind."* This shows that leadership is practical, guiding communities toward resilience. In fact, Mloza-Banda (2005) demonstrates that community-led agricultural projects in Malawi thrive under strong leadership, as chiefs encourage participation and collective responsibility. This reinforces the relevance of leadership in your research, since crop diversity cannot be sustained without collective action, and leaders act as catalysts for embedding diversification into community norms.

Knowledge Sharing and Local Adaptation

Respondents noted that leaders organize meetings to share farming knowledge, encourage crop diversification, and coordinate responses to climate challenges. Farmers explained that chiefs help spread information about intercropping and soil conservation, ensuring that even vulnerable households are included. This finding resonates with Green (2009), who stresses that trust between leaders and farmers enhances adoption of new practices, since farmers are more willing to follow advice from respected figures. This is crucial because crop diversification is not just a technical practice but a socially mediated where local leaders build trust and legitimacy, making farmers more likely to adopt methods like polyculture or crop rotation, thereby strengthening resilience.

What role does seed sharing play in supporting crop diversity?

Respondents emphasized that seed sharing among neighbors helps them access different crop varieties, especially when they cannot afford to buy seeds. This practice encourages polyculture and strengthens resilience. One respondent said, *"I ask my neighbor for seeds so I can plant them together with maize and beans."* This aligns with Isabell et al. (2017), who argue that genetic and species diversity, often sustained through local seed exchanges, enhances adaptability to climate stress and supports community resilience. In the context of your research, seed sharing is not just a coping mechanism but a community-driven pathway to diversification, showing how social networks directly contribute to agricultural resilience and development.

Chapter Summary

This chapter has described the specific objectives and themes of this research in exploring the significance of crop diversity in resilience to climate change impact to small scale farmers. Each research objective was expanded to showcase its importance in elaborating themes of the respondent's views and understanding

of the topic and it brought impactful insights to the findings of the research.

CHAPTER FIVE CONCLUSION AND RECOMMENDATIONS

Introduction

This chapter presents the summary of the research findings, conclusion, recommendations, and area for further study. The chapter aligns the study's findings with the three specific objectives, existing literature, and the realities observed within the community. It interprets the meaning of the results, highlights the implications for livelihoods and food security, and explains how crop diversification serves as a practical adaptation strategy for vulnerable rural households.

Summary of Research findings

The demographic characteristics of this study include age, level of education, source of income. The response rate for questionnaires was 106.5%. The majority of the respondents were between the ages of 25-30. The most respondents that were involved in this study were young men and women, since the study was focused on productive small scale farmers, those that can still practice farming without difficulty. Below is the summary of the research findings.

The study revealed that climate change has significantly disrupted food security in Tungulue Village. Erratic rainfall, prolonged droughts, and increased pest infestations have reduced crop yields, particularly for staples like maize. These disruptions lead to seasonal food shortages, increased dependence on markets, and lower nutritional intake. Households struggle to maintain consistent food supplies, and many experience heightened vulnerability to hunger, demonstrating that climate variability is a key driver of food insecurity in small- scale farming communities.

Crop diversification emerged as a vital strategy for enhancing resilience and improving livelihoods. Farmers who cultivated a variety of crops including drought-tolerant staples and cash crops reported more stable food production and additional income streams. Diversification also improved soil fertility, reduced pest pressures, and contributed to better nutrition. By spreading climate risk across multiple crops, households were able to maintain productivity even under harsh weather conditions. These findings highlight how adopting diverse cropping systems supports both community development and sustainable agricultural practices.

The study found that low crop yields caused by climate change through droughts, floods, and erratic rainfall have had serious effects on households in Makanga villages. Families experienced food shortages, reduced income, and greater vulnerability to poverty. Heavy reliance on maize monoculture worsened the situation, since when maize fails, households often have no alternative crops to rely on. This has led to nutritional insecurity, increased dependence on external aid, and heightened social stress within communities. Crop diversification was shown to reduce these risks by ensuring households have multiple sources of food and income, even when one crop fails.

Conclusion

The results showed that small scale farmers are facing the after math of continuous climate change in Makanga village. This study shows that crop diversity is vital for helping small-scale farmers in Makanga and Tungulule villages withstand climate change. Reliance on maize monoculture leaves households vulnerable to different natural calamities, while diversified farming through intercropping, crop rotation, and root crops like cassava improves food security, soil health, and household resilience.Community leadership and climate-smart practices further strengthen adaptation, though challenges such as limited resources and weak institutional support remain. From a social work perspective, linking agricultural resilience with social protection ensures vulnerable groups are not left behind.

Recommendations

The researcher recommends that community seed banks and indigenous crop varieties should be promoted to preserve biodiversity and strengthen resilience. Partnerships with research institutions can provide drought-tolerant and pest-resistant crops.

The researcher also recommends that there should be strengthening agricultural extension services and information flow where digital platforms such as SMS and radios can deliver timely climate-smart advice to farmers.

Another recommendation is that farmer cooperatives and digital marketplaces can strengthen bargaining power and connect producers directly with the small scale farmers in Makanga village.

Area of further study

The study recommends that the researcher should explore into the “Role of Crop Diversity in Reducing Climate Change–Related Stress and Enhancing Mental Well-Being Among Small- Scale Farmers in Makanga Village”