BINDURA UNIVERSITY OF SCIENCE EDUCATION



DEPARTMENT OF GEOSCIENCES

HARNESSING INDIGENOUS KNOWLEDGE FOR INCLUSIVE CLIMATE-RESILIENT ADAPTATION: THE CASE OF WARD 27, ZAKA DISTRICT.

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

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APPROVAL FORM

The undersigned certify that they have read the dissertation and have approved its submission for marking, confirming that it conforms to the department requirements.

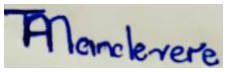
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DECLARATION

I, Tatenda Agnes Mandevere Reg Number B221805B do hereby declare that the work submitted here is the result of my own independent investigation and that all the source I have quoted have been indicated and acknowledged by means of complete references. I further declare that the work is submitted for the first time at this university or faculty and that it has never been submitted to any university or faculty for the purpose of obtaining a degree.

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Date: ___28/05/2026

DEDICATION

I proudly dedicate this work to the Almighty God; it would not have been possible to complete this research. I would also like to dedicate it to my beloved brothers Tafadzwa Mandevere and Akudzweishe Mandevere and my parents who continues to give me the impetus to aim higher.

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ABSTRACT

This study explores how indigenous knowledge systems can be harnessed to promote inclusive and climate-resilient adaptation in Ward 27, Zaka District Zimbabwe. The area is increasingly vulnerable to climate-related shocks including prolonged droughts, erratic rainfall and declining agricultural productivity which threaten food security and livelihoods. While conventional adaptation strategies are often externally driven this research examines how local ecological knowledge, traditional weather forecasting and indigenous farming practices contribute to community resilience. Using a qualitative case study design data was collected through interviewing the key informant which includes elders and agricultural extension officers and field observations. Findings indicate that practices such as zunde raMambo, conservation of indigenous seed varieties and traditional soil and water management techniques remain critical for coping with climate variability. However, these practices are increasingly marginalized due to limited policy recognition, generational knowledge loss and weak integration with formal disaster risk reduction frameworks. The study argues that inclusive adaptation requires the co-production of knowledge where indigenous and scientific approaches are integrated into local planning and DRR strategies. Recommendations include documenting and validating IKS, strengthening community-based early warning systems and embedding indigenous practices into Ward-level climate adaptation policies. This approach enhances cultural relevance and community ownership and long-term sustainability of resilience intervention.

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CHAPTER 1: INTRODUCTION

1.1 Introduction

Climate change keeps affecting the rural livelihoods of Zimbabwean communities especially in areas like Zaka where agriculture is highly dependent on rain. Community members describe how poor weather conditions including long periods of drought have affected their food security and left them unable to predict the coming crop yields. It has been confirmed by other researchers that Indigenous Knowledge Systems are crucial in adapting to climate change due to their potential to provide adaptation strategies developed through years of interaction with the environment (Gumbo et al., 2023). However although IKS has proved to be valuable it has been ignored in formal adaptation plans.

1.2 Background of The Study

Climate change has been identified as one of the most critical problems facing humanity in the 21st century evidenced by increased temperatures, changes in rainfall patterns and occurrences of extreme weather phenomena. Such disturbances are likely to affect both the ecosystem as well as people especially in vulnerable areas like sub–Saharan Africa. According to the IPCC (2022) climate change poses particular risks to people in rural areas who rely on natural resources because of their low levels of adaptation and infrastructure. Districts of Zimbabwe like Zaka continue to face climatic threats that compromise agriculture, water management and sociocultural integrity. It is against this background that researchers have shown increasing interest in the role of IKS in addressing climate change. According to Nyong et al. (2020), IKS represents years of experience in learning about and taking care of the environment. The locals in Zaka point out how they use seasonal forecasts diversity in crops and water conservation as survival methods just like UNFCCC (2018) suggests IKS should be incorporated into formal climate policy frameworks. Recognition of the diversity of knowledge systems across the globe has made strides. As per Alexander et al. (2020), adoption of epistemological pluralism in climate governance can ensure successful management of climate challenges through knowledge co-production by scientists and Indigenous groups. However, Nakashima et al. (2021) point out that although there is increased appreciation of IKS it continues to be overlooked because of epistemic, institutional and documentation issues. Building bridges in these areas calls for partnership frameworks that allow local participation in the African region; Mapara (2009) emphasizes the vulnerability of the rural poor since their livelihoods depend heavily on the natural cycle of life. Southern Africans have adopted different techniques like

agroforestry, rainwater conservation and indigenous seed preservation in an attempt to cope with climatic uncertainties. The rural regions in Zimbabwe exemplify effective Indigenous Climate Adaptation practices with Zaka District being a key area of investigation. Mutasa (2023) identifies ICA practices such as rainmaking rituals, ecological calendars and planting drought-resistant seeds as forms of environmental governance. Mugambiwa & Tirivangasi (2021) reveal that these practices guide rural communities in coping with droughts and floods. The village people perceive these actions both as survival mechanisms as well as cultural traditions passed down from generation to generation. However despite the relevance of these indigenous practices to climate change adaptation efforts they continue to remain marginalized and unexplored by official processes and plans in the region. This study will endeavour to investigate the possibilities of documenting and integrating IKS into a more contextual adaptation approach. Specifically, through a study of the agriculture, water and ecology practices used by villagers in Ward 27 of Zaka district, this paper intends to shed light on the potential benefits of IKS in improving climate adaptation in a culture-sensitive manner. Overall the present study will contribute towards building a body of literature in support of the need for decolonizing climate adaptation with scholars pointing to the need to empower Indigenous people in the environmental governance process.

1.3 Statement of The Problem

Climate change remains an ongoing challenge in rural areas worldwide with vulnerable places such as the Zaka district in Zimbabwe suffering because of its dependence on environmental resources. Unpredictable rainfall, persistent droughts and ecological problems continue to hinder agriculture. The locals speak of how planting seasons used to be predictable but have turned erratic with the community unsure about the availability of food. An urgent need for an effective adaptation process that considers the challenges faced by the people in those regions emerges from this situation. IKS contains useful ways of coping with climatic changes that are proven to work due to their long history of application and experience. According to Nyong et al. (2020) as well as Mapara (2009), IKS entails a variety of practices that include environmental resource utilization and preservation as well as seasonal forecasting and rituals. Attempts to fill this gap through an investigation of the ways in which IKS may be utilized for promoting climate change adaptation strategies that would contribute to making adaptations more inclusive within Ward 27 of the Zaka district. Through its focus on the local agricultural, water and ecological management practices they highlight the importance of traditional

knowledge in contemporary adaptation strategies. The research takes an approach informed by the theory developed by Nakashima et al. (2021).

1.4 Justification of The Study

Climate change still impacts more adversely rural areas like those of the Zaka District in Zimbabwe. These areas depend heavily on natural resources thus they have been highly vulnerable because of their poor infrastructure, economic condition and low adaptive capacity for example farmers in the Zaka area explain that when there are long periods of drought, they are compelled to use crops resilient to drought or conduct rain-making rituals. This highlights the need for adapting to climate change using local strategies that consider people's experiences. Indigenous Knowledge Systems provide a great wealth of information on the environment since they have emerged from generations of interacting with the environment. Nyong et al. (2020) point out that IKS is characterized by high adaptive capacity since it takes into consideration. However, while IKS is clearly valuable its use within climate change adaptation policy frameworks is limited particularly in Zimbabwe which tends to prioritize foreign scientific models. Exclusion of IKS in climate policies at the national level leads to poor community resilience and creates a rift between policy implementation and reality. According to Mugambiwa and Tirivangasi (2021), there needs to be a paradigm shift towards an approach that will bring together top-down and bottom-up strategies through adaptation techniques that consider rural perspectives and local practices. This research on harnessing IKS for inclusive climate-resilient adaptation seeks to fill this gap by exploring the role of IKS in climate change adaptation in Ward 27 of the Zaka district. The UNFCCC (2018) stresses the need for a comprehensive integration of different knowledge systems into climate change response actions in order to achieve sustainability and inclusiveness.

In conclusion this research provides additional insights into the larger initiative aimed at creating a new vision of resilience through knowledge diversification and community empowerment. The idea of a collaborative process whereby indigenous and scientific knowledge systems come together is suggested by Nakashima et al. (2021). In line with this recommendation, this research highlights how the involvement of indigenous knowledge plays a vital role in helping Zaka, Ward 27 cope with the negative impacts of climate change in Zimbabwe.

1.5 Aim

Harnessing Indigenous Knowledge for Inclusive Climate-Resilient Adaptation in Ward 27 Zaka District Zimbabwe. The research aims at merging traditional knowledge practices into contemporary methods of adaptation to improve the adaptive capacity of policies and communities.

1.6 Primary Objectives

1. To determine the Indigenous knowledge systems used in climate change adaptation in Zaka District.

2. To evaluate the effectiveness of IKS strategies in fostering climate-resilient adaptations within the study community.

3. To design a framework for integrating IKS into formal climate adaptation approaches in Zaka District enhancing inclusivity and local relevance.

4. To assess the socio-demographic characteristics of the study population and their influence on the use and transfer of Indigenous Knowledge Systems in climate change adaptation in Ward 27, Zaka District

1.7 Research Questions

1. What are the Indigenous knowledge systems used in climate change adaptation in the Zaka District rural area?

2. How effective are the IKS strategies used in climate-resilient adaptations in the study area?

3. What framework can be used to integrate Indigenous Knowledge Systems into climate change resilience strategies in the Zaka District?

1.8 Literature Gap

The incorporation of indigenous knowledge systems into climate-resilient adaptation approaches has received considerable attention from scholars in recent times. Nonetheless notable lacunae exist in the literature especially in relation to the application of IKS on a localized scale within Zimbabwe. According to Nyong et al. (2020) although research at the international and regional levels has investigated the contribution of IKS towards climate adaptation there is a paucity of scholarship on how these knowledge systems operate within local contexts including within the community of Zaka District. Indeed farmers within Zaka tend to express the exclusion of their indigenous practices from the mainstream planning

process an issue which undermines the creation of relevant frameworks reflective of the rural setting. Mapara (2009) identifies a tendency within the literature to homogenize the African IKS system without considering the sociocultural and ecological factors influencing local practices.

However, in Zaka where the environment and culture are unique the lack of local studies makes it difficult to appreciate the successful approaches used by the indigenous people when incorporating them into the planning process. The preference for scientific knowledge over traditional ecological knowledge means that the strategies employed to adapt to the changing environment lack cultural and local relevance. According to Nakashima et al. (2021), the gap between the two knowledge systems is the reason why IKS is not often considered when formulating policies and making decisions. Mutasa (2023) explains that there are very few cases that have documented the specific practices used by indigenous communities to cope with the impact of climatic changes in the rural areas of Zimbabwe, especially in the district of Zaka. Though some cases mention IKS there are not many studies that have been conducted to examine the contributions made by the indigenous people to the fight against climate change at the community level. Mugambiwa and Tirivangasi (2021) advocate for research that is culturally rooted, context-specific and responsive to community needs. Addressing the gaps identified above this research on harnessing IKS for inclusive climate-resilient adaptation seeks to document and evaluate Indigenous practices in Ward 27, Zaka District that support climate-resilient livelihoods. By doing so it contributes to the broader discourse on sustainable development and offers practical insights for policymakers, practitioners and scholars aiming to design inclusive and effective adaptation strategies in Zimbabwe and beyond.

1.9 Limitations of The Study

Despite the relevance of this research in providing vital information on the use of the Indigenous Knowledge Systems to adapt to climate changes in Ward 27, Zaka District there are some issues that cannot be overlooked for example according to Nyong et al. (2020), recording and verifying Indigenous knowledge systems is often complicated due to the fact that the knowledge is often passed down by word of mouth. As explained by the farmers themselves the majority of the knowledge is handed down through storytelling, ritual activities and personal experience. In addition gaining access to locals who have deep knowledge of the indigenous practices within the community is often difficult especially considering factors such as lack of trust and perceptions of outsiders. Gaining the confidence of the local people is necessary but time-consuming as the villagers appreciate patience. Logistical problems

including transport and communication in distant areas within the district may pose a barrier to conducting thorough research. According to Mugambiwa & Tirivangasi (2021), temporal constraints related to climate variability and socio-economic changes are another issue. As local realities shift the usefulness and application of IKS recorded may vary calling for continuous evaluation and adjustment. The farmers of Zaka tend to adapt their rituals, crops and water management systems according to the shifting realities proving the dynamic nature of IKS rather than its static nature. In addition, this research might not cover all the relevant dynamics of national policy that would affect how IKS can be incorporated or marginalized in the mainstream climate policies.

1.10 Delimitation of The Study

This study will be conducted in one geographical area Ward 27, Zaka District in Zimbabwe following the work of Mapara (2009), where she notes that both climate change impacts and IKS are very local phenomena. Focusing on a particular district provides the opportunity to conduct a detailed case study of climate resilient agricultural practices however it also limits the generalization of results to other regions with different ecosystems, social and economic conditions. The main source of IKS in the Zaka region is oral tradition and practical experience. This creates certain difficulties for research since conventional methods of research are unable to provide the full picture of IKS. According to the farmers from Zaka District their wisdom is passed through stories, ecological calendars and practical life experience not literature. Therefore this study focuses on ecological, agricultural and cultural knowledge associated with climate resilience excluding all aspects of IKS related to rituals and spirituality. This research is temporal in nature and hence may not capture the changes that take place seasonally or over a period in the practices by the Indigenous communities. According to Mugambiwa and Tirivangasi (2021) IKS is flexible and adapts to changes in the climatic environment and socio-economic situation. The farmers in the Zaka district adopt their rituals, choice of crops and methods of water management based on the changing environment which means that IKS is adaptable over time.

1.11 Definition of Key Terms

1.11.1 Indigenous Knowledge Systems

IKS is the knowledge, beliefs, practices and cultural values of Indigenous societies that have been shaped through time by generations of such societies. This knowledge entails a holistic understanding of the ecosystem, resources and adaptation approaches within which the

community operates based on their own historical and cultural background (Nyong et al., 2020). In rural areas in Zimbabwe farmers frequently mention how indigenous knowledge is conveyed in stories, ecological calendars and cultural practices both reflecting survival approaches and cultural identity. IKS is not static but continues to change and develop through experience and interaction with nature (Mapara, 2009).

1.11.2 Climate-Resilient Adaptations

Climate resilient adaptations are strategies and practices designed to enhance the capacity of communities, ecosystems and economies to withstand and recover from the impacts of climate change. These adaptations aim to reduce vulnerability and increase resilience by integrating both traditional and scientific knowledge (IPCC, 2024). Climate resilient adaptations include measures such as sustainable agriculture, water management and disaster risk reduction (UNFCCC, 2022).

1.11.3 Inclusive

In the context of climate adaptation, "inclusive" refers to strategies and practices that consider and involve diverse perspectives, needs and knowledge systems. Inclusive approaches aim to ensure that all members of a community, particularly marginalized and vulnerable groups are actively engaged and benefit from adaptation efforts (Nakashima et al., 2021). Inclusivity in climate adaptation promotes equity, social justice and collective resilience.

1.11.4 Adaptations

Adaptations are adjustments in natural or human systems in response to actual or expected climatic stimuli or their effects. These adjustments seek to moderate harm or exploit beneficial opportunities arising from climate change (IPCC, 2024). Adaptations can be proactive (anticipatory) or reactive and they can involve behavioural, structural or institutional changes.

1.11.5 Ward 27, Zaka District

Ward 27 Zaka District is a geographically distinct area located in Masvingo Province, Zimbabwe. The area is characterized by a mostly rural population which derives their living from agricultural practices and other activities based on the utilization of natural resources. Community members have been seen explaining how the frequent droughts and unpredictable weather patterns have been affecting their food security and sustainability rendering them prone to climate change risks (Mutasa, 2023). The works of Nyong et al. (2020), Mapara (2009), Nakashima et al. (2021) and UNFCCC (2022) define crucial terms that serve as the building

blocks in this study on Indigenous knowledge systems for climate resilient adaptation in Ward 27. Defining these terms serves to enhance clarity in the discussion of this study's core issues.

1.12 Chapter Summary

The incorporation of indigenous knowledge systems into climate resilient adaptation in Ward 27, Zaka District was analysed with regard to the significance but under-utilization of IKS in official mechanisms (Nyong et al., 2020) and the conflict that exists between science and traditional methodologies with respect to equity (UNFCCC, 2022). Mutasa (2023) emphasized gaps in studies conducted in the local community whereas Nyong et al. (2020), Mapara (2009), and Nakashima et al. (2021) outlined the fundamental concepts. The research questions revolved around identifying, analysing and incorporating IKS. It should be noted that limitations and delimitations are clearly articulated. In summary this chapter serves as an introduction to Chapter 2 on the literature review.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter focuses on the theories and concepts that are the bedrock of IKS with regard to climate resilient adaptation of the residents of Ward 27, Zaka District. This chapter looks into the manner through which IKS contributes towards the local efforts geared towards adaptation to climate variability using cultural wisdom. This chapter uses resilience theory and IKS theory as the basis for building a model for localized adaptation. Issues such as traditional ecological knowledge, integrating indigenous and scientific approaches and inclusive resilience emerge as the important areas in the current literature.

2.2 Theoretical Framework

The theoretical framework is the foundation for the discussion of IKS within the context of climate resilient adaptation in this study serving both as the guide to methodology and the interpretation of the findings. It combines aspects of resilience theory, systems theory and IKS theory that provide a structural view of the interplay between tradition and socio ecological systems especially when it comes to changes in the environment. Such an approach allows for a deeper understanding of how indigenous knowledge helps develop adaptations while at the same time ensuring sustainability and inclusivity

2.2.1 Resilience Theory

The theory of resilience offers a significant perspective on how people communities and ecosystems cope with shocks from the outside world especially in relation to climate change. Originating from ecology the theory has developed to become applicable to socio ecological systems through their ability to withstand shock reorganize and preserve essential functionalities as noted by Holling (2019) and Folke et al. (2020). The main pillar of this theory is adaptive capacity which denotes the capability to adapt and learn from changes. Ecological resilience. IKS play an important role in fostering resilience through locally informed solutions for dealing with environmental variability. According to Berkes et al. (2018), the strategies embedded in these knowledge systems based on long term lived experiences include crop diversity, agroforestry and water conservation techniques that reflect the characteristics of ecological resilience. In addition, Berkes and Folke (2016) propose adaptive co-management where Indigenous knowledge and science merge to optimize the management of natural ecosystems. Farmers from Zimbabwe usually mention how these approaches not only facilitate adaptability but also preserve the community's cultural legacy by making IKS a scientific and

sociocultural resource in climate change mitigation efforts. The resilience approach is consistent with the principles of feedbacks and interdependencies within socio ecological systems which are manifested in the practice of Indigenous land use strategies. Gómez-Baggethun et al. (2017) reveal how IKS support ecosystem services such as pollination, nutrient cycling and biodiversity preservation through ceremonies and rotational agriculture that promote ecological stability. In Zaka communities for example there are practices where rainfall is monitored and used to determine appropriate planting intervals which constitutes adaptive management in terms of resource utilization in response to environmental stimuli.

Further the theory highlights that diversity and redundancy are key determinants in ensuring stability in the system. According to Adger (2018), social resilience refers to the ability of societies to withstand and bounce back after undergoing stress which may be caused by their collective culture. Cultural systems of indigenous knowledge play a vital role in creating such resilience by incorporating adaptive measures through community ritual practices, decision-making procedures and knowledge transmission across generations. Through such processes the cultural system not only promotes sustainability in the environment but also strengthens community resilience against climate-related risks. According to Reid et al. (2019), Indigenous groups typically have profound observations of changes in the environment allowing them to adapt proactively using past trends. In the adaptive cycle framework proposed by Holling (2019) there are four stages namely growth, conservation, release and reorganization akin to the Indigenous knowledge systems that recognize cyclical use and rejuvenation of resources. According to Miller et al. (2022), one of the limitations of resilience theory is the silencing of the Indigenous voice. Olsson et al. (2020) suggest that adaptive governance involves empowering local stakeholders and incorporating Indigenous Knowledge Systems into resilience approaches.

2.2.2 Indigenous Knowledge Systems Theory

The IKS theory emphasizes the importance of locally derived cultural knowledge in solving real world problems particularly pertaining to sustainability and resilience to climate change. According to Berkes (2017), IKS refers to a pool of practical and experiential knowledge passed down through generations based on close observation, spiritual practices and conservation efforts. Unlike universally accepted science-based approaches IKS theory is local and relational making it a more appropriate source to guide adaptive measures that fit the specific ecosystem. Therefore IKS theory is an important source of guidance for the creation of sustainable and resilient rural environments like that of Zaka which is influenced by

indigenous wisdom gained from lived experiences. Adaptability is one of the core principles of IKS theory. Agrawal (2018) dispels the myth about Indigenous knowledge being static by suggesting that it is actually an adaptive process involving learning through trial and error. Such flexibility corresponds with the resilience theory approach that emphasizes learning and transformation whereby communities can adapt to climate variability using ecologically and culturally appropriate strategies. The flexible nature of indigenous knowledge systems underscores their applicability in socio ecological systems that experience rapid change.

IKS provides a holistic epistemological perspective that includes the environment, society and spirituality. According to Briggs and Sharp (2021), the integrative epistemology of Indigenous knowledge stands out compared to the reductionist nature of modern science where variables are studied separately. Resource management systems like water conservation or forestry in the Indigenous world involve rituals, prohibitions and social institutions that ensure equality and sustainability. The integration approach guarantees that the adaptive measures are not only scientifically sound but also socially inclusive and morally appropriate thus reinforcing the unity of humans and their surroundings. Furthermore IKS yields detailed information about place specific conditions that complement scientific research findings. Gadgil et al. (2016) stress the importance of indigenous knowledge in understanding regional climatic trends, soil properties and ecological changes aspects that are usually ignored by the global models. These place-based insights can be useful for planning adaptation measures at the microlevel including crop rotation. In combination with scientific instruments such as remote sensing and forecasting indigenous knowledge improves the efficiency of adaptation techniques. The combination of different kinds of knowledge leads to a more sensitive approach to climatic changes. Although it has several advantages the application of IKS in climate-related discussions is hindered by some problems concerning epistemology and institutional structures. According to Mazzocchi (2019), the problem with the application of indigenous knowledge is that when it is made part of official discussion its cultural dimension tends to be overlooked. Nakashima et al. (2020) argue for interdisciplinary research involving respect for epistemic diversity and co-production of knowledge. In addition to the technical benefits of such collaboration, this approach is also ethically necessary because indigenous people suffer from climate change most. The recognition of IKS as a kind of legitimate knowledge will allow researchers and decision-makers to develop more comprehensive approaches to environmental change.

2.2.3 Sustainable Livelihoods Framework

The SLF offers a multidimensional tool for examining the means by which a community sustains its livelihood through the mobilization of five essential components human, social, natural, financial and physical assets as described by Chambers and Conway (2015). The main idea behind the SLF involves viewing livelihoods as dynamic processes involving a combination of asset availability, threats and institutions. Vulnerability to climatic conditions makes Indigenous knowledge an essential component in the livelihoods of communities like Ward 27 of the Zaka District which helps build resilience, adaptation and sustainability in a changing environment. Human capital comprising of skills, knowledge and good health is an essential pillar of the SLF. The Indigenous knowledge system is an important part of human capital since it consists of accumulated experience from generations of management and adaptation of ecological conditions. As stated by Altieri (2017), knowledge on techniques such as intercropping, agroforestry and rotation ensure climate resilience and food security. Indigenous knowledge on medicine also ensures community members' good health thus making them capable of engaging in economic activities.

Social capital defined by networks trust and shared norms is deeply intertwined with Indigenous knowledge systems. Passed through oral traditions, rituals and communal decision making IKS fosters social cohesion and collective action. Berkes and Folke (2016) illustrate how communal irrigation systems and resource-sharing practices exemplify the role of Indigenous knowledge in promoting equitable access and ecological sustainability. The active involvement of elders in knowledge transmission strengthens intergenerational resilience and ensures that adaptation strategies remain culturally anchored and socially inclusive. Natural capital including land, water and biodiversity is managed through Indigenous practices that align with ecological principles. Gómez-Baggethun et al. (2017) highlight how traditional weather forecasting, sacred groves and Indigenous tree planting contribute to biodiversity conservation and climate adaptation. These practices reflect a deep understanding of local ecosystems and serve as buffers against climate-induced vulnerabilities. By sustaining ecosystem services and promoting regenerative land use Indigenous knowledge enhances the long-term viability of natural assets essential for rural livelihoods.

Lastly, it is important that SLF focuses on vulnerability issues as well as institutional aspects because it makes us realize the need for integration of indigenous knowledge within the governance systems. According to Olsson et al. (2020), adaptive governance needs to be embraced in such a way that it allows for empowerment of the local people and legitimizes

their traditions. Even though integration of indigenous knowledge can help with preparing better for disasters as well as adapting to climate changes, it is marginalized within institutional systems according to Mazzocchi (2019). Miller et al. (2022) argue that inclusive institutional support is essential for scaling IKS and embedding it within sustainable development strategies

2.2.4 Relevance of These Theories to This Study

The combination of resilience theory, systems theory and Indigenous Knowledge Systems theory serves as the multidimensional base for exploring the climate-adaptation strategies of Ward 27 of the Zaka district of Zimbabwe. The combination of these theories allows for the analysis of the relationship between climate changes, community initiative and indigenous knowledge from different angles. The combination of the three theories ensures that the contribution of indigenous knowledge systems in ensuring sustainability and socio ecological harmony in rural communities can be comprehensively assessed. According to resilience theory communities and ecosystems have the ability to withstand shocks, adapt and maintain their integrity despite climate changes (Holling, 2019; Folke et al., 2020). Such a theory is essential in understanding how the indigenous approaches including the use of crop diversity, water conservation and collective management practices contribute to socio-ecological resilience. The systems theory is further enhanced through the identification of how the interrelatedness of ecology, society and institution contributes to the overall process of climate resilience development and how Meadows (2015) recommends tracing the influence that knowledge has from one area to another in order for one to understand its impacts on adaptability of people to climate change. On the other hand IKS theory sees traditional knowledge as a dynamic cultural system that contributes significantly to scientific knowledge while offering place-based solutions to climate variability as explained by Berkes (2017) and Agrawal (2018). Both theories offer an analytical framework to make the research more robust since the information will be analysed against these theories to make sense out of data. The two theories will ensure that information is not considered in isolation but within cultural, ecological and institutional context. Such triangulation of theories makes the study capable of drawing lessons that can contribute to global knowledge but based on local conditions

2.3 Conceptual Framework

The concept framework makes connections between Indigenous knowledge systems, climate change resilience through adaptation and local adaptation measures. The questions asked in the research as well as the methodological approaches will be guided by this framework as it allows

understanding the role of traditions in building resilience and sustainability. Farmers in Ward 27 explain how ecological calendars, seed storage and shared use of water help them survive which shows the practical side of adaptation. This approach makes it possible to align the research with its goals and create a plan for investigating the issue within the community. By referring both to scholarly literature like Nyong et al. (2021), Berkes (2017) and Folke et al. (2020) as well as the situation in the community the study puts emphasis on the importance of Indigenous knowledge.

2.3.1 Indigenous Knowledge Systems

IKS includes the collective body of accumulated knowledge that has been developed through continuous engagement with their environment, according to Berkes (2017). As Altieri (2017) states its localization allows for the development of specific practices based on an in-depth comprehension of the ecosystem, including soil types, microclimates and biodiversity. IKS is transmitted orally via storytelling, rituals and apprenticeships thus embedding it in cultural and spiritual stories which promotes identification and cohesion as highlighted by Mazzocchi (2019) and Berkes and Folke (2016). Holistic in nature and culturally embedded IKS involves a harmonious relationship between humans and the natural world that contrasts the fragmented approach of scientific research as outlined by Gómez-Baggethun et al. (2017). Taking for example practices like crop rotation, preserving sacred sites and community-based water management are considered examples of sustainable adaptation based on traditional values. In climate settings IKS provides indigenous weather forecasting systems and innovative practices to enhance biodiversity such as intercropping and agroforestry which minimize environmental vulnerability, as indicated by Gadgil et al. (2016) and Altieri (2017).

Notably the IKS concept recognizes ecosystems as social-ecological systems that are interconnected which is consistent with resilience and systems theory principles, as pointed out by Berkes (2017). Nevertheless the incorporation of the IKS system into official climate adaptation policies faces epistemological and historical barriers as observed by Agrawal (2018) and Mazzocchi (2019). The need for inclusive and participatory models becomes critical in ensuring Indigenous people's participation and involvement in the development of knowledge as suggested by Berkes (2017). IKS is indeed an indispensable source of adaptive knowledge especially for the communities it serves. Its incorporation in climate resilience frameworks contributes to promoting equity and sustainability as highlighted by Gómez-Baggethun et al. (2017). Communities living in rural Zimbabwe provide practical examples through the use of ecological calendars, seed conservation and sacred forests.

2.3.1.1 Climate Resilient Adaptations

Climate-resilient adaptation refers to measures that involve actions or methods put in place to help people adapt or adjust to changes in climate in an effort to improve their adaptive capacities. These actions increase the ability of individuals or societies to withstand shocks or disturbances such as storms, changes in temperature and rainfall as highlighted by Adger (2018). One of the important aspects of these adaptations is the use of natural and human systems to facilitate sustainability. Ecosystem-based methods including agroforestry and wetland restoration utilize ecosystem services to combat adverse effects of climate change and foster sustainable livelihoods as discussed by Gómez-Baggethun et al. (2017). Similarly community driven adaptation involves the integration of local knowledge and culture into adaptation processes. In Zimbabwean rural areas for instance people explain how rainwater harvesting and intercropping help to ensure their food security and also enhance social relationships. Adaptations for climate change are oriented towards sustainability in order to cope effectively with dynamic climatic hazards. They are designed in such a way as to allow adjustments according to changing socio-environmental conditions. In line with the principles of sustainable development, climate resilient adaptations contribute to food security and equity thus making efforts towards building resilience more sustainable and effective. They tackle the issue of equity by giving priority to marginalized groups in order to build resilience among vulnerable communities as noted by Adger (2018).

2.3.1.2 Relationship Between Key Concepts

IKS and Climate Resilient Adaptation are strongly related and intertwined especially in rural areas where indigenous knowledge acts as the basis for tackling climate variability. This can be seen in the dynamic interaction between the two main ideas whereby IKS provides culture based and place-based approaches to enhancing resilience while an inclusion framework ensures the fair and scalable adoption of such practices.

2.3.3 Indigenous Knowledge and Resilience to Climate Variability

IKS have an indispensable place in building the resilience of communities against climate variability thanks to their experience-based knowledge which has been developed over years of observation trial and error. IKS are perfectly adapted to the prevailing environment hence making them highly efficient for managing climate risks and supporting livelihoods. The traditional farming methods like intercropping, crop rotation and cultivation of drought-

resistant varieties not only increase biodiversity but also guarantee stable production and food security in unpredictable climates as shown by Altieri (2017).

Water management is another field where IKS makes important contributions towards resilience to climate change. Methods of rainwater harvesting, irrigation and preservation of wetlands and sacred groves are some examples of sustainable use of natural resources based on the principles of Indigenous ecological ethics as discussed by Berkes and Folke (2016). Such techniques not only solve the problem of water shortages during drought periods but also sustain the delivery of ecosystem services like flood prevention and protection of biodiversity. Through their reliance on ecological cycles such approaches ensure the interrelatedness of socioecological systems through adaptive stability. One of the defining characteristics of IKS is the tradition of ecological forecasting which allows communities to prepare for climatic changes in advance. The knowledge gained from observations of animal behaviour, phenology and astronomical signs provides an early warning signal about weather changes and helps to make decisions regarding agriculture and other activities as pointed out by Gadgil, Berkes and Folke (2016). Such forecasting methods prove to be particularly useful for areas where reliable meteorological data is difficult to obtain.

In the end IKS supports resilience through the integration of adaptation in cultural and ecological contexts. This is because the elements of diversity, sustainability and community integration in IKS support the tenets of resilience. The recognition of IKS within climate change adaptation policies can help reinforce the efforts at adaptation while affirming the role of indigenous knowledge and action towards such efforts.

2.3.3.1 Inclusivity and Scaling Indigenous Practices

Inclusivity is an important component that must be incorporated in the scaling process to ensure that any form of climate adaptation strategy meets the needs and considerations of every individual within the community. Traditionally communities have emphasized the principles of collective decision-making and management of their resources which make it easy to integrate inclusivity into the adoption of Indigenous knowledge systems However it is important to note that active measures should be taken to incorporate marginalized individuals such as women and the elderly. In particular women have been noted to possess extensive traditional knowledge in matters related to agriculture, water management and seed storage. As Similarly, the involvement of elders as holders of Indigenous wisdom ensures that knowledge is transmitted across generations thereby maintaining Indigenous knowledge systems. Through

inclusivity different community resources can be mobilized leading to the creation of more effective adaptation approaches. Inclusion of community members into collaborative adaptation can increase chances of success through building trust and sense of ownership. Workshops and information exchange platforms for instance allow local stakeholders and outside experts to share information which increases the scalability of traditional methods and maintains their relevance culturally as described by Olsson et al. (2020).

In terms of policy inclusivity plays an important role in promoting the adoption of IKS into the formal process of adaptation. Empowering the indigenous communities in the process of governance and decision-making guarantees that not only do their practices remain intact but also are scalable enough to achieve adaptation objectives. According to Miller et al. (2022), adaptive governance models that promote local ownership and inclusivity will ensure institutional commitment to the adoption of IKS and allow its scaling through regional and national policies. The interaction between IKS and climate resilient adaptations can be seen in the light of place specific indigenous practices that offer climate variability solutions. IKS offers evidence-based practices of increasing resilience whereas inclusivity allows for scaling these practices within the community. Through collaboration, innovation and inclusivity this interaction is an illustration of the potential contribution that can be made by IKS to sustainable development and climate change resilience for example in the case of rural Zimbabwe, combining inclusivity with local traditions can lead to increased community resilience.

2.4 Literature Supporting Theoretical and Conceptual Frameworks

Conceptual frameworks in this research are informed by a number of studies that highlight the significance of Indigenous knowledge systems for building resilience against climate change. The scholarly literature offers lessons on the use of IKS in the design of CBA interventions through real-world examples that justify the conceptual framework used and point out gaps important for the situation of the rural area.

2.4.1 Agroforestry Practices

Agroforestry a technique based on indigenous knowledge that incorporates trees into cropping and animal husbandry promotes the provision of ecosystem services and livelihoods. In East Africa, the Chagga home gardens in Tanzania serve as an excellent example of sustainability. multistorey agroforestry systems that replicate the processes of natural ecosystems help contribute to biodiversity, improving soil quality and ensuring food security as Altieri (2017) argues. The basis of such techniques fits the definition provided in systems theory in showing the connections between elements in the ecosystem and agriculture. Another example of sustainable agroforestry system comes from Central America where the Quesungual Slash and Mulch Agroforestry System is used to prevent soil erosion and increase yields. According to Gómez-Baggethun et al. (2017), this approach takes advantage of local knowledge to establish climate-resilient agriculture techniques. Similar sustainable agricultural practices like intercropping with local trees and small agroforestry farms have been observed in Zimbabwe as well.

2.4.2 Traditional Forecasting and Climate Adaptation

The indigenous population tends to use their traditional ecological indicators for forecasting weather and making decisions regarding agriculture such as the Sámi population in Northern Europe who forecast the season based on the behaviour of their reindeers and the nature of the snow (Mustonen, 2021). This demonstrates the holistic approach to climate adaptation in IKS

.2.5 Regional and Global Examples of Resilience Through Indigenous Practices

2.5.1 Pacific Islands

IKS and coastal ecosystems the use of indigenous knowledge systems has played an essential role in the management of coastal ecosystems in the Pacific Islands. Traditional approaches for preserving coral reefs and mangroves have been effective in helping people cope with increasing water levels and severe climatic conditions. Such traditional approaches which incorporate cultural beliefs with natural ecological systems offer examples of how IKS can be used to foster resilience.

2.5.2 Sahel Region

Tackling desertification in the Sahel the use of traditional land management practices such as the zaï technique and FMNR have played a critical role in combating land degradation and boosting agricultural production in the region. The use of these techniques illustrates how local knowledge plays an important role in climate change adaptation by improving soil fertility and moisture retention (Reij et al., 2021).

2.6 Chapter Summary

In this chapter we have managed to create a connection between theoretical and conceptual frameworks and the research purpose of examining how indigenous knowledge systems promote locally embedded and inclusive climate change adaptations in Ward 27 of Zaka district. The theories of resilience, systems and indigenous knowledge systems offer a starting point for the examination of community-driven initiatives. The conceptual framework allows us to apply the theoretical concepts through the identification of important factors such as inclusivity, adaptation measures and socio-ecological impacts. Both frameworks will be critical in developing the Research Methodology chapter where they will inform the choice of participatory research approaches and qualitative research instruments.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

In this chapter the methods employed in exploring the ways through which indigenous knowledge systems enable inclusion in climate resilience adaptation are explored within Ward 27, Zaka District Zimbabwe. The research was undertaken using qualitative research philosophy and participant cantered approaches (Chilisa, 2020; Smith, 2021). The study focused on indigenous knowledge systems and community participation. A case study design allowed for interactions between researchers and the communities through PRA techniques, interviews and focus groups. Ethical issues were addressed in terms of culture, consent and reciprocity.

3.2 Research Design

The research study employed a qualitative case study approach (Yin, 2018) in investigating the ways in which indigenous knowledge systems use indigenous knowledge to foster an inclusive approach to climate-resilient adaptation in the case of Ward 27, Zaka District, Zimbabwe. Emphasizing the perspectives of the communities and their traditions in coping with the adverse impacts of climate change the study incorporated elements of phenomenology and ethnography (Stake, 2023; Flyvbjerg, 2021) to bring out the views of the farmers, traditional leaders, spirit mediums and other development actors who were able to shed light on the sociocultural and institutional aspects of climate vulnerability and adaptation. The study used various qualitative data collection techniques such as semi-structured interviews, focus group discussions, PRA methodologies and field observations in understanding the challenges that communities face in accessing livelihood resources and climate adaptation strategies embedded in Indigenous knowledge. The purposive sampling technique was used to identify individuals who had experience in dealing with climate-related problems such as farmers, village leaders and agricultural extension workers. The use of this method enabled the inclusion of different viewpoints from individuals based on their gender, age, land ownership and agriculture-related activities.

The interviews probed questions about agricultural inputs, market connections, food security and institutional support while the focus groups focused on commonalities in their drought experience, land degradation and socioeconomic exclusion. Community leaders and other service providers helped in understanding local views about climate risks as well as the informal networks and indigenous practices which help people cope with those risks. The data

collected were analysed using inductive thematic analysis to allow emergent themes to develop based on the data collected. Some of the major themes include infrastructure challenges (such as poor roads and inadequate irrigation), land tenure concerns, gender dynamics in adaptation and some locally developed coping strategies like cooperative farming and savings clubs. Important ethical considerations guided the study starting with obtaining consent and maintaining confidentiality. Cultural sensitivity was exercised in conducting the interviews by speaking to respondents in their own language choices (such as English, Chi Shona, or Shangani). The study benefited greatly from a narrative and context driven approach.

3.3 Research Approach

The qualitative approach was used in this study to explore the various issues and adaptations among rural farmers in Ward 27, Zaka District Zimbabwe which are faced due to climate vulnerability. This study is centred on the infrastructural challenges, availability of agricultural inputs and services, livelihoods security and innovations by the communities. According to Creswell (2018), qualitative methods provide a powerful way of examining the complexity of social events since they enable researchers to understand individuals' experiences and perceptions. Qualitative methods rely on narrative-based information hence they are well equipped in capturing the experiences of farmers, traditional leaders, spirit mediums and other development partners. Therefore, adopting a qualitative approach ensures that the voices of the participants are heard and understood. The use of a case study methodology as suggested by Yin (2018) is the best approach since the study is concerned with investigating vulnerability and its effects on the lives of rural people. The case study approach allowed the researcher to explore several interrelated factors like land availability, agriculture-supporting infrastructure, market connection, and community involvement in order to conduct a comprehensive investigation into the socio-economic and institutional processes involved in climate adaptation. According to Stake (2023), one of the advantages of the single case study method is the provision of contextual information regarding the phenomena studied especially in vulnerable areas. Ward 27, Zaka District, marked by a number of resource limitations, irregular rains and poor service delivery was therefore a suitable case study site.

To have a thorough qualitative research study different data gathering methods were used such as semi structured interviews, focus group discussions, field observations and document analysis. The use of semi-structured interviews involved talking to the farmers themselves, village heads, agricultural extension workers and community leaders to obtain firsthand accounts of the difficulties they face, the support institutions they rely on and the coping

strategies they implement. Focus group discussions helped promote group discussion among other elderly members of society, thus facilitating better comprehension of common obstacles and coping mechanisms developed within the community. Field observations involved recording the farming practices being used the conditions of their homesteads and interactions between individuals in the community. Document analysis involved the examination of local government documents, NGO reports, agricultural development plans and other community-based activities in addition to the semi-structured interviews and field observations.

The analysis of data was conducted using an inductive thematic analysis as suggested by Braun and Clarke (2019). Repeated themes including infrastructural limitations (e.g., bad road network, lack of irrigation facilities) as well as land tenure problems were identified and examined. The issue of gendered adaptive capacity and innovations (e.g., savings group, communal farming and local ecological knowledge systems) were among the important findings of the study. In this way the findings derived from the research have been empirically justified with the help of participants' views and experiences. With the use of a qualitative case study approach this research explored the problem of climate vulnerability considering not only socio-economic but also socio-cultural and institutional aspects of rural livelihoods. In this way the use of multi-method qualitative research design contributed to the identification of the practical implications of the study in order to engage policymakers, practitioners and other stakeholders in a dialogue about rural adaptation and resilience building.

3.4 Research Instruments

In order to have a thorough knowledge on the utilization of Indigenous knowledge systems towards the formulation of community-based adaptation strategies to enhance local resilience to climate change this research made use of several qualitative tools for data gathering which allowed a thorough investigation of the respondents' experiences, actions and interaction within their institutional contexts in Ward 27, Zaka District. As Merriam (2016) states, employing different sources of data contributes to making qualitative research more valid and credible.

3.4.1 Semi-Structured Interviews

Interviews that are semi-structured in nature were held with the farmers, village headmen, agriculture extension workers and other community members to obtain insights on the factors affecting the sustainability of rural livelihoods amidst the context of climate change vulnerabilities in Annexure A. Semi-structured interviews according to Patton (2015) provide an excellent opportunity to document the experiences of participants using their own words while also maintaining consistency when addressing key thematic areas. The interview questions focused on aspects such as access to agricultural inputs, land ownership, market accessibility, institutional support and coping measures within the community especially indigenous-based strategies. Such interviews yielded valuable narrative-driven data which is fundamental in thematic analysis. See interview guide in Annexure A.

3.4.2 Field Observations

An observational approach was adopted for two days in order to capture information regarding the homestead settings, infrastructure status and farmer involvement in agricultural processes within Ward 27 of the Zaka district. The main areas of focus included water access, the condition of roads, sources of farming inputs and the dynamics involving farmers and agricultural extension officers through community meetings and farm visits. Such an approach provided first-hand accounts on the issues surrounding climatic vulnerabilities and rural living conditions. It further highlighted the linkages between indigenous knowledge systems and the existing agricultural extension services in terms of labour practices, water harvesting and land use patterns. This allowed for a more complete picture of the infrastructural, economic and socio-cultural forces driving climate-resilient adaptation by farming households refer to observation check list at Annexure B.

3.4.3 Document Analysis

Triangulation and reliability were achieved through the analysis of official government reports, agricultural development strategies, NGOs' documents and local livelihood programs related to Ward 27 in Zaka district. According to Denzin & Lincoln (2018), triangulation improves the credibility and trustworthiness of qualitative research through corroborating findings from different sources of data. Reading about policies and rural development strategies allowed for an evidence-based understanding of organizational structures, governance and local communities' response to climate-related stressors. It also provided important insights into how

much recognition is given to indigenous knowledge systems and their role in climate adaptation processes.

3.4.4 Thematic Coding and Data Analysis

Theme coding as outlined in the Braun & Clarke (2019) approach was used to code and analyse qualitative information systematically. Themes emerged through an inductive analysis whereby the research process was allowed to unfold with a focus on the exploration of challenges related to climate change and the response of local farmers to those situations in Zaka. Information obtained was classified based on different themes that emerged in the research including but not limited to constraints related to infrastructure, availability of agricultural inputs and services insecure land tenure systems as well as community-based approaches that incorporate traditional wisdom.

3.4.5 Significance of Research Instruments

Inclusion of interviews, observation and documentation ensured the study's methodological rigour thus providing multiple perspectives concerning the challenges of climate vulnerability and livelihoods in Ward 27 in Zaka District. In addition the inclusion of narratives, observations and documentation allowed for deeper interpretations regarding the social, economic and cultural aspects influencing the adaptation practices of local communities. Such insights can be used in the formulation of appropriate.

3.5 Population

The Zaka District found in the Masvingo Province, Zimbabwe comprises mainly rural communities that derive their means of livelihood from subsistence agriculture and informal trading. As stated in the Zimbabwe Population Census 2022 the distribution of the population within the different wards found within the Zaka District depends on various factors including accessibility to resources agricultural land and presence of infrastructure. Wards that lie close to growth points and other areas with service centres have been reported to have high population densities and access to agricultural services and infrastructure. However wards far away from growth points have experienced various difficulties due to poverty issues which include poor transport and lack of agricultural services.

These disparities highlight the need for place-based initiatives that are able to consider the reality on the ground for marginalized farmers. As emphasized by Scoones (2015) and Chambers (2017), the application of place-based strategies is important in rural development, especially where the utilization of local Indigenous knowledge is concerned. This is due to the

fact that Indigenous knowledge can promote sustainable and climate-resilient livelihoods. In the case of Ward 27, Zaka District, Indigenous ecological knowledge associated with local farming and seasonal calendars can be applied in developing adaptation strategies.

3.5.1 Target Population

The population under investigation in the current research project was an assorted number of people involved in or affected by climate change and resilient adaptations in Ward 27 within Zaka District. They included small-scale farmers, traditional authorities and agricultural extension workers. Small-scale farmers were important sources of information on the lack of infrastructure, limited availability of agricultural inputs, problems with ownership of land and various adaptive strategies that originated from Indigenous knowledge. As the custodians of ecological and communal governance knowledge traditional authorities made a significant contribution to the development of adaptive strategies. Agricultural extension workers contributed to technical expertise and facilitated communication between formal structures and local farming communities.

Institutional interventions policy frameworks and capacity building were contextualized by government personnel and policymakers working in the agricultural, rural development and social welfare departments. The involvement of NGOs and development organizations provided external knowledge, resources and pilot projects to enhance the livelihoods of rural communities. Such a broad-based stakeholder approach is indicative of the participatory approach espoused by Cornwall and Jewkes (2015). According to these authors development should be a collaborative effort between the government and the community rather than something imposed on them. As emphasized by the Food and Agriculture Organization (FAO) collaboration among stakeholders from different sectors is crucial for enhancing resilience in marginalized communities as seen in the case of Zimbabwe. However special care had been taken in selecting stakeholders for Indigenous Knowledge Systems. As highlighted by scholars like Briggs (2018) and Nygren (2016), IKS is more than a practice as it involves culturally situated systems of meanings which are limited to certain custodians who need to be negotiated in order to have access to their knowledge. It is against this backdrop that the study focused on authentic IKS as it involved interaction with the elders, traditional authorities, and experienced farmers who were perceived to be the legitimate carriers of the local knowledge. It is worth noting that this way of conducting research contributed to the respect and protection of Indigenous ecological knowledge in the context of adaptation approaches

3.6.1 Thematic Analysis

A thematic analysis was carried out on qualitative data using the six phases as proposed by Braun & Clarke (2019). With this, it was possible to identify patterns and themes that emerged from interviews, discussions and field visits in relation to the actual experiences of poor farmers, local leaders and households living in Zaka. The themes included lack of inputs for farming, food insecurity, exclusion from the markets among others.

3.6.2 Content Analysis

The incorporation of primary data into an institutional and policy background a content analysis technique was used to look at government documents, and records pertaining to the development of rural areas. This helped in analysing how the nation and districts have responded to the problem of poverty among farmers in terms of resources, agricultural assistance schemes and social security policies. A two-pronged technique of thematic and content analysis allowed for a comprehensive analysis whereby community perspectives were combined with institutional ones in a bid to create a comprehensive picture of the effects of poverty on the rural farmers of Zaka District. Through the use of these techniques it was possible to answer pertinent research questions concerning farming inputs, food security, markets and coping strategies by the communities.

3.7 Ethical Considerations

Ethical considerations played an integral role in the respect for the rights of the subjects involved in the study while preserving integrity and credibility. Firstly adequate and thorough information was provided to the participants on the objectives of the research, its methodological framework and possible implications for them so that they could make up their mind whether they want to take part in the study or not. Consent forms and information sheets were used to inform the participants about the nature of the study and the voluntary character of their participation. Moreover participants were allowed to pose any questions or to refuse to participate in the research at any stage of the process. All their responses and information were kept confidential using pseudonyms, especially where they referred to lack of access to land, food insecurity, low incomes, and other socio-economic challenges.

3.8 Validity and Reliability

Validity and reliability were important for making sure that research results were valid and reliable. Validity was ensured through certain strategies to make sure that the study would measure its objective effectively. For construct validity research tools like interview guides and questionnaires were created based on existing research and theoretical foundations, rural livelihood and community-based development. Constructs like availability of agricultural inputs, food security, income generating activities and market integration were tied up to previous research works and the rural development paradigm of the country. Content validity was assured by seeking help from experts like agricultural extension workers, development workers and district workers in the process of developing the research tools.

The issue of internal validity was addressed by considering possible confounding variables like variations in ownership of the land, household sizes, level of experience in farming and availability of extension services. In this way, any observations made could be accurately attributed to socioeconomic variables and not to external factors from the environment. The issue of reliability was tackled by adopting measures that ensured consistency and replicability. This was achieved through piloting the study tools by using a few rural farmers in Zaka to test out any ambiguities and inconsistencies in the questionnaires. To attain inter-coder reliability more than one researcher analysed the qualitative data independently, but any differences in the analysis were sorted out to ensure consistency. To establish test-retest reliability the same questionnaire was administered to a sample of respondents at various times. Insights gleaned through interviewing farmers and local leaders were supported through the review of relevant policies, agriculture audit reports and economic statuses of households.

3.9 Chapter Summary

The methodology for conducting this study is detailed in this chapter. It involves the use of a qualitative approach in examining the problems faced by the people, their resources, coping mechanisms and reactions. The study seeks to incorporate different angles while observing ethical considerations. The aim is to derive useful information that will help and develop rural development projects in Zimbabwe

CHAPTER 4: DATA PRESENTATION AND ANALYSIS

4.1 Introduction

The chapter presents the findings on the Indigenous Knowledge Systems of climate resilient adaptation in Ward 27 of the Zaka District. Using both qualitative and quantitative approaches the research reveals that traditional forecasting methods as well as water conservation, farming practices are some of the key mechanisms. Several authors have shown the relevance of these localized practices in sustaining the rural livelihoods for example, Nyong et al. (2021), Mapfumo et al. (2019), among other authors have emphasized their usefulness. Berkes (2017) notes their ecological significance, while Matondi et al. (2021) advocate for their complementarity with scientific knowledge to build resilience.

4.2 Demographic Information of Participants

The demographic characteristics of the respondents were considered to test the reliability and validity of the use of IKS in inclusive climate resilient adaptation practices in ward 27 of Zaka District. The higher response rate among the demographic groups guarantees the validity of the collected data. This is shown in table 4.1 below.

Table 1 ***Table 4.1 Distribution of Participants***

Participant Category	Targeted Participants	Actual Responses	Response Rate %
NGO/CBO Representative	5	3	60
Policy makers/Development Practitioners	5	4	80
Community Members	10	7	70
Indigenous Knowledge Holders	10	8	80
Farmers	25	19	76
Total	55	41	75

The information presented in Table 4.1 concerning the distribution of respondents and the response rate of 75% for Ward 27, Zaka district demonstrates a good level of involvement by all stakeholders with IKH having the highest participation rate of 80% followed by Policymakers and development practitioners at 80%, farmers at 76% while the lowest rate was from NGOs/CBOs at 60% because of other competing engagements. The community members also provided a moderate level of participation of 70% depending on their awareness and accessibility. According to Babbie (2021), it is important to have a response rate of more than

70% in any form of social research. This means that it is reliable and valid. In the same way Creswell (2018) argues that a high level of participation makes any qualitative and quantitative analysis valid and reliable.

4.2.1 Participant Distribution by Years of Experience in Climate Adaption

To measure the level of local knowledge respondents were classified according to their education and their experience in adaptation to climate. It is important to know the characteristics of this demography because they affect the transfer of knowledge. This classification is seen in Table 4.2.

*Table 2**Table 4.2 Participant Distribution by Years of Experience in Climate Adaption & Level of Education***

Demographic Factor	Category	Number of Respondents	Number of Percentage
Educational Background	No Formal Education	5	12
	Primary Education	9	22
	Secondary Education	14	34
	Tertiary Education	13	32
Years of Experiences in Climate Adaptation	1-5 Years	8	19
	6-10 Years	14	34
	11-20 Years	12	29
	Above 20 Years	7	17

From table 4.2 above it is evident that as far as experience with regards to climate adaptation is concerned the highest proportion is that of 34% with experience between six to ten years whereas almost half with 46% have more than 10 years of experience indicating extensive indigenous experience. The level of education is rather high in most cases where 34% of respondents have education up to the secondary school level although 12% had no education at all. According to authors such as Chambers and Berkes, diversity, age, gender, experience and education influence the effectiveness of adaptation practices.

4.2.2 Gender Composition

Gender composition was analysed to understand the different roles and vulnerabilities of men and women regarding climate change adaptation. As illustrated in Figure 4.1, the majority of research participants (56%) were female, while 44% were male. This distribution likely reflects local socio-economic dynamics more men migrate away from their homes for employment leaving women to manage households, child-rearing and local agricultural activities.

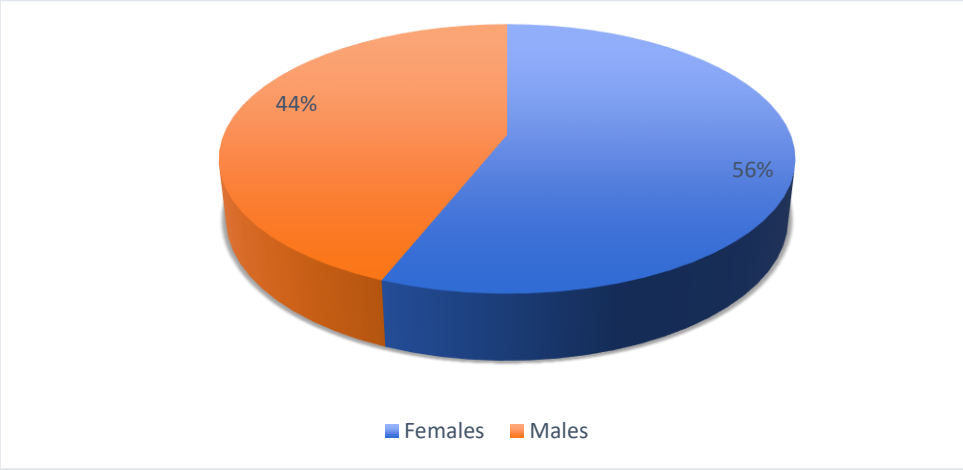


Figure 1Figure 4.1. The distribution of participants by gender

The data in figure 4.1 shows gender composition of the respondents to which the majority is 56% of all the research participants were actually females while 44% were male. This can be generalized that more men are working far away from their homes than their female counterparts due to the nature of their jobs and family responsibilities. Women are more likely to work at home or at least closer to their homes as they will be looking after children as compared to men. On the other side, according to the latest Zimbabwean national population census report which was conducted in 2022, the country has got more women compared to men thus this could also be taken into consideration as the higher turnout of women.

4.2.3 Distribution of Participants by Age

The study analysed the age distribution of participants to gauge which generational cohorts are most active in implementing climate adaptation strategies. As shown in Figure 4.2, the demographic analysis indicates that individuals aged 31–45 form the largest active group, followed closely by those aged 46–60. This indicates that middle-aged participants are the most actively engaged in IKS-based climate adaptation, leveraging their accumulated life experience and generational knowledge.

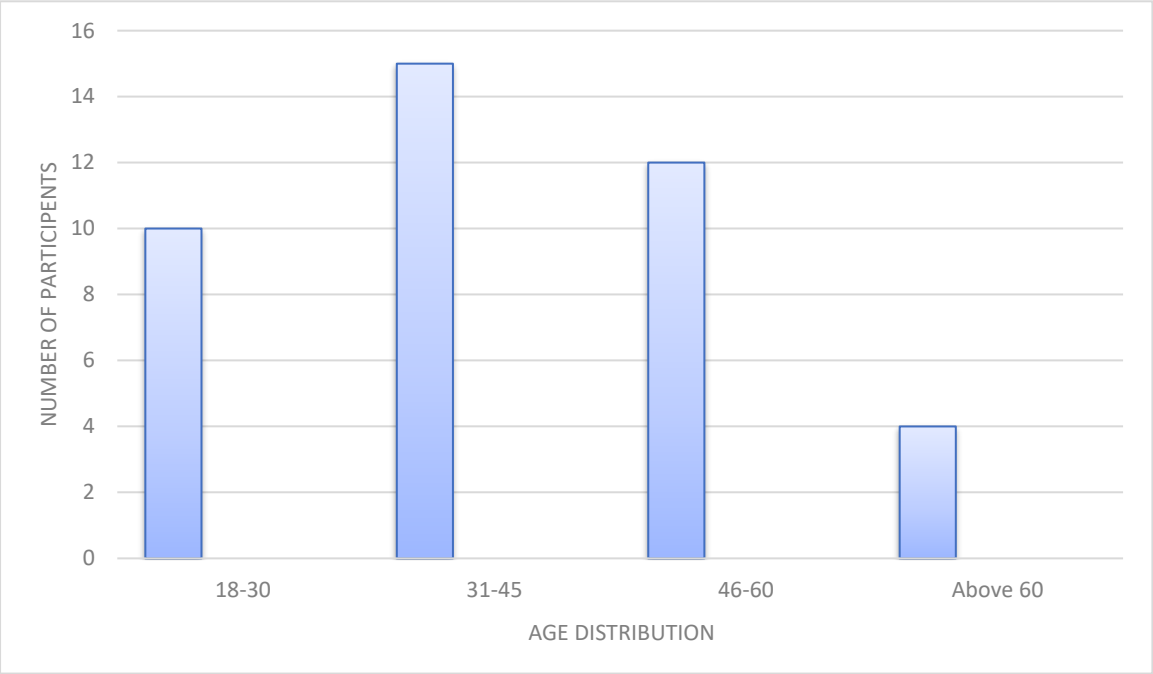


Figure 2Figure 4.2. The Distribution of Participants by Age

The data in figure 4.2. shows that the demographic analysis of respondents in Ward 27, Zaka District are 31–45 years old, followed by those aged 46–60 indicating that middle-aged participants are the most actively engaged in Indigenous Knowledge Systems based climate adaptation due to their accumulated experience.

4.3 Indigenous Knowledge Systems Used in Climate Change Adaptation

In Ward 27, Zaka District IKS was highly regarded by the participants for climate change adaptation. Four major approaches were mentioned including traditional weather forecasting, water saving techniques, crop diversification and disaster management. As illustrated by one of the farmers, "We will know rains are coming when ants make their nests high." The phenomenon is consistent with Nyong et al. (2021)'s view that African communities commonly

employ animal and plant phenology for seasonal predictions. Similarly, water-saving techniques were common with the statement, "We dig shallow ditches and mulch to retain soil moisture," which is corroborated by Mapfumo et al. (2019)'s observation that water-saving strategies help conserve soil fertility. Crop diversification through planting sorghum and millets was also encouraged as "Small grains resist any climate," in agreement with Berkes (2017)'s belief that indigenous foods resist harsh environmental conditions. Lastly, disaster management was critical, where families kept food reserves and strengthened household structures "Dried vegetables and grains are kept for cases of food shortage," as stated by Moyo (2019), where traditional storage serves as a strategy to protect against any potential shock.

Though useful participants highlighted difficulties in application "These days the rains fall either too early or too late thus we find it difficult to rely solely on our strategies." In line with this idea, researchers like Matondi et al. (2021) point out that a combination of IKS and current science results in a blend that increases resilience and scalability. It is clear from this information that even though local strategies are highly effective their sustainability relies on institutionalization documentation and complementarity with scientific solutions.

Traditional weather forecasting methods in Ward 27 rely heavily on ecological indicators observed by farmers. Figure 4.3 shows migratory birds, one of the key animal behaviours used by communities to predict seasonal rainfall patterns.



Figure 3Figure 4.3: Migratory birds used as an IKS weather forecasting

Observing animals is one of the most common methods used as a traditional weather forecasting method in Ward 27 as shown in figure 4.3. This was confirmed through one of the key informant interviews held where the research participant added:

The arrival and behaviour of migratory birds help us in predicting seasonal changes and guide farming decisions. Certain bird species appear at specific times of the year, signalling the coming of rains, temperature changes or dry spells for example, when migratory birds arrive earlier than usual farmers interpret this as an indication of an early rainy season, prompting them to prepare their fields. If the birds delay or behave unusually it is understood as a warning of poor rainfall or a possible drought

Phenology of plants is yet another important traditional technique that is employed by the people of Zaka District for making predictions. The wild loquat fruit tree is depicted in Figure 4.4. This plant is used by local farmers to predict rainfall.



Figure 4Figure 4.4: Wild loquat fruit tree used as an IKS weather forecasting

In Zaka mazhanje (wild loquat) is commonly used as an Indigenous Knowledge System method for weather forecasting. Communities observe the abundance, size and timing of mazhanje fruit to predict seasonal rainfall. When the trees produce many large fruits, it is taken as a sign of a good rainy season ahead while a poor harvest signals the likelihood of drought or below-normal rainfall. Early ripening suggests early rains whereas late ripening indicates delayed rainfall. These natural indicators help farmers in Ward 27 plan their planting activities and prepare for the coming agricultural season. Observing wild loquat fruit trees is one of the most common methods used as a traditional weather forecasting method in Ward 27 as shown in figure 4.4 This was confirmed through two of the key informant interviews held where the research participants added:

When we see that mazhanje are many and big, we know the rains will be good. This sign has guided our farming for years and if mazhanje ripen late or the trees produce very little, we take it as a warning of drought, so we prepare differently for the season. **Traditional Knowledge Holder**.

Sometimes even before the forecast on the radio we know what the season will be like just by looking at the mazhanje. Few fruits mean we must plant drought-resistant crops; this knowledge has saved many families here. **Farmer**

4.3.1 Evaluation of the Effectiveness of IKS Strategies

To evaluate how communities apply indigenous knowledge respondents identified the main strategies used for climate adaptation. Figure 4.5 summarizes the proportion of participants employing each IKS strategy in Ward 27.

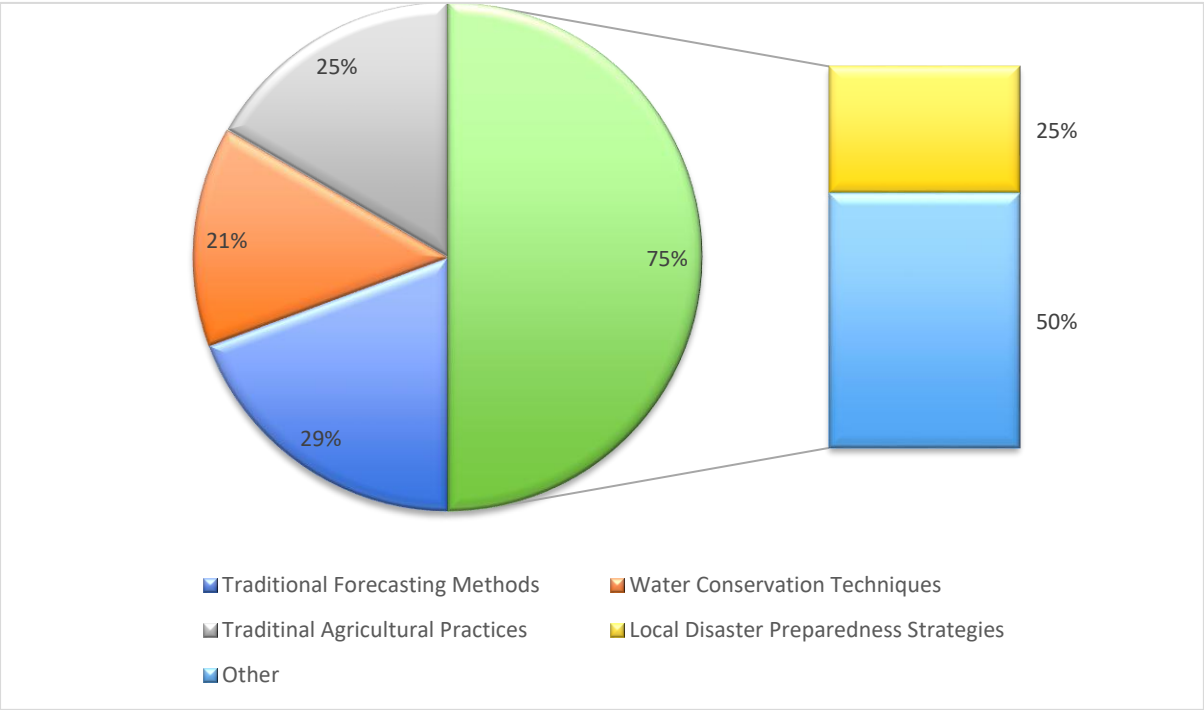


Figure 5Figure 4.5: Strategies Adopted by local Communities in Climate Change Adaptation

Figure 4.5 illustrates that there was a positive perception of using traditional forecasting practices which were described by participants as follows "Whenever we notice birds migrating earlier than normal, we understand that this is going to be a tough dry season." According to Nyong et al. (2021) similar ecological cues are widely applied throughout the continent. Nonetheless participants also acknowledged that nowadays such methods can complement modern meteorology "These days we also verify it via radio". This indicates an increasing trend

towards combining indigenous knowledge systems with science since forecasting was identified as one of the key elements in Figure 4.5. Techniques involving water conservation, including terrace farming and mulching 21% in Figure 4.5 were viewed positively "Through constructing stone bunds, we managed to retain water, and this has greatly benefited our crops." These methods were associated with efficient irrigation in keeping soil moisture according to Mapfumo et al. (2019). Nonetheless NGO employees pointed out that scaling up of such techniques was challenging due to the lack of necessary infrastructure. Conventional agricultural systems based on small grains such as sorghum and millet were given importance in Figure 4.5 by 25%. "We grow small grains because they will live through dry periods." The resilient nature of these plants in unpredictable weather is stressed by Berkes (2017). But the young generation was worried about the market demand for these plants. "People like maize more than anything else, even in years where maize fails due to drought."

Disaster management plans like grain storage and seed banking represented by the value 25% in Figure 4.5 was deemed essential because "Our stored grains can last for months, but if the drought persists for too long, then there would be a need for help from the government." This view is reinforced by the opinion of Moyo (2019) about the role of storage techniques in food security. The authorities recognized the benefits of indigenous knowledge systems, yet insisted on their integration with contemporary techniques "We do not ignore our indigenous knowledge systems but integrating it with science would provide better adaptive measures." The idea of using hybrid solutions based on IKS and modern innovations is further supported by Matondi et al. (2021). Generally, both Figure 4.5 and the opinions of respondents reflect the reliability, sustainability, and cultural nature of IKS. Nevertheless, the effectiveness of IKS would require institutional support and integration with modern technologies.

4.3.2 Incorporating IKS in Climate Change Adaptation

In order to integrate indigenous knowledge systems into climate change adaptation in Ward 27, Zaka district it is important to have adequate institutional mechanisms, policy considerations and no barriers to the process of implementation. There was an urgent call for recognition and incorporation which is evidenced by one participant stating, "We need to participate in climate policy meetings rather than being mere observers." This is consistent with the theory of participatory governance discussed by Berkes (2017) as it helps in ecological conservation. One of the challenges faced was a lack of documentation, where most knowledge is passed orally "We know things through generations, but because we don't document ourselves, others don't understand," stated a knowledgeable participant. According to experts like Mugabe and

Mukamuri (2020), inadequate documentation limits knowledge credibility and sustainability. Another challenge was intergenerational issues whereby "the youths have stopped learning from us and hence use modern technology," argued one elder. It corresponds to the conclusions reached by Matondi et al. (2021) emphasizing the necessity of combining Indigenous Knowledge Systems with formal learning for sustainability purposes. The policymakers and NGOs were sceptical about it, with one NGO representative saying, "The government's programs focus on the use of modern technology, which is measurable; but we have got to do something about recognizing traditional technologies as well."

The restrictions imposed by infrastructure deficits also hinder scalability farmers mentioned "We have ways of conserving water with our methods but we don't have the resources to extend it outside small pieces of land." According to Mapfumo et al. (2019), indigenous seed banks and irrigation technologies have not been invested in hence limiting traditional knowledge to smallholder settings. Lastly the importance of bottom-up initiatives was highlighted by the participants. "We already have our ways of adapting; we just need policies to improve on our efforts, not take over." This is consistent with Moyo's (2019) assertion that grassroots initiatives should reinforce national strategies. In summary, the results indicate the significance of multi-stakeholder participation that integrates indigenous knowledge systems, institutional capacity, and scientific evidence. The hybrid strategy guarantees that IKS does not become marginal but becomes an indispensable component of resilience in Zaka District

4.4 Effective Strategies Employed by Communities

The secondary data analysis provides support for the findings obtained from Ward 27, Zaka district by providing an academic basis for the findings. The research conducted by Nyong et al. (2021), illustrates that indigenous knowledge systems (IKS) have always been important in climate adaptation in Africa especially in relation to traditional forecasting systems that include things like phenological observations of plants observation of animals and wind direction. This is supported by the use of environmental cues to forecast seasonal changes such as the movement of birds and blooming of certain plants. In addition to this, Mugabe & Mukamuri (2020) note that the process is embedded within social structures in rural settings.

The practices of water conservation that have been recorded by Mapfumo et al. (2019) can be used as another form of validating the strategies that have been adopted by locals in Zaka. The use of contour farming, mulching and terracing is common among the Zimbabwean rural population, where such techniques are adopted in order to ensure that there is an increase in soil moisture and erosion minimization. It is important to note that these findings corroborate what the interviewees noted about the utilization of stone bunds, furrows and mulching for sustenance of crops amid the drought periods. According to Moyo (2019), seed preservation and community seed banks are crucial for the preservation of seed variety which is evident from the local disaster preparation practices through the storage of grains and dry vegetables.

Additional comparative observations of other areas also help to establish the significance of Indigenous Knowledge System for example, Berkes (2017) shows how indigenous agriculture in South America and Asia contributes towards soil fertility and biodiversity along with resistance to deforestation. Likewise, Salick and Byg (2021) demonstrate how Tibetan herders employ indigenous weather cues to control the movements of livestock, thereby promoting sustainable management of pastures while at the same time minimizing any potential adverse effects of climatic change. Such examples help to demonstrate that although indigenous knowledge varies from place to place, the common elements of sustainability, adaptability and environmental conservation continue to be universal.

Collectively, these studies prove the critical relevance of IKS in climate change adaptation. According to Matondi et al. (2021), the application of indigenous knowledge alongside scientific methods can help to fill in the gap between ancient and modern ways of knowing, thus increasing resilience. In this sense such a combination makes adaptation more effective and reliable since it relies on culturally-based practices while being scientifically proven. In this regard the review of the literature proves the necessity to include IKS in climate change policy due to its critical role in locally-grounded adaptation processes in Zaka District.

4.5 Community-Driven Resilience Strategies

Resilience-building efforts by the community formed one of the key themes representing the joint efforts of the community members in dealing with the threats posed by climate change. Community respondents acknowledged that adaptation measures such as seed banking by the community sharing information on farming skills, and coordinating disaster relief efforts improved overall resilience. "Together as a community we save our seeds and teach each other how to farm in case the rains don't come," one farmer explained. It became evident that climate change adaptation was not only a personal initiative but rather a collaborative approach to build resilience.

Some researchers, like Chambers (2017) and Nyong et al. (2021), have emphasized the potential of participatory methods in helping communities develop resilience by harnessing resources and knowledge from the local environment to improve sustainability. As revealed, it can be said that through collective efforts there will be more resilient safety nets that will help protect households when affected by climate variability.

4.5.1 The Use of Cultural Heritage in Climate Change Adaptation

The theme of cultural heritage played out significantly in the study by way of how culture is used as the basis for land stewardship. Rituals, taboos and customary laws control resource use so as to ensure harmony between man's activities and environmental sustainability. "The wisdom of our forebears is to respect the earth, and we have applied it in our current agricultural practices," noted one of the elders in the tribe. The role of culture in sustainability is elaborated on by Berkes (2017), who asserts that culture integrates the practice of ecological sustainability within its traditions and customs to ensure sustainability over time. In addition, Mugabe and Mukamuri (2020) point out the fact that culture confers social acceptability to adaptation practices through its legitimacy to enable the adoption of these practices within the community.

The results indicate that cultural identity plays a critical role in shaping the process of sustainable resource management beyond being a symbol

4.5.2 Challenges in Incorporating Indigenous Knowledge Systems within Formal Policy Structures

Although there is evidence of the importance of incorporating IKS, certain obstacles exist that prevent its integration into formal climate change policies. Table 4.3 illustrates some of the major obstacles cited by the respondents and the literature.

*Table 3**Table 4.3 Challenges to the incorporation of IKS within formal policy structures***

Challenge	Description	Evidence from Respondents /Literature	Implication for Policy Integration
Marginalization of IKS	IKS is often perceived as outdated or less relevant	Findings show it is being overlooked despite its effectiveness	Valuable adaptation strategies remain underutilized
Lack of a validation framework	No standardized mechanisms to test or verify IKS for policy use	Implied by the need for validation by policymakers	Limits credibility and acceptance in formal governance
Generational Knowledge loss	Young generations are less engaged in preserving IKS	Mugabe &Mukamuri (2020) note generational shifts	Risk of knowledge erosion before it is documented or applied
Epistemological divide	Differences between scientific methods and experimental indigenous knowledge	Nyong et al (2007) emphasize preference for quantifiable data	Create tension and limits integration of diverse knowledge systems
Policy maker scepticism	Policy makers question the credibility ok IKS without scientific validation	Translating it into national policy requires scientific validation	Delays or prevents inclusion of IKS in national strategies
Limited documentation of IKS	IKS is largely oral and not systematically recorded	Mugabe & Mukamuri (2020) highlight oral transmission as a barrier	Difficult to reference, validate and incorporate into a formal system
Lack of institutional recognition	IKS is not formally acknowledged within government and policy institutions	Respondents noted imitated recognition of indigenous practices	IKS remains excluded from official climate policies and frameworks

The data in table 4.3 shows challenges of integrating IKS into formal policy frameworks. Description of challenges, evidence from respondents or from literature and the implications for policy integration.

4.5.3 Integration of IKS Into Climate Resilience Strategies

Opportunities in interdisciplinarity became one such way to improve resilience techniques. Respondents from academia and policymakers recommended a mix of approaches integrating indigenous knowledge systems with scientific knowledge. "By combining our indigenous knowledge of weather systems with modern science we will be able to come up with better adaptation techniques," said one respondent from the NGO. This shows that the role of IKS is increasingly viewed as complementary to innovation in technology.

Matondi et al. (2021) reinforce this arguing that hybrid approaches create stronger, scalable resilience frameworks. Berkes (2017) also notes that interdisciplinary integration ensures that adaptation strategies are both culturally relevant and scientifically robust. The findings suggest that structured frameworks where Indigenous and scientific methodologies coexist can produce more effective adaptation measures. This theme underscores the importance of collaboration between communities, policymakers and researchers in building inclusive and sustainable climate resilience ensuring that adaptation strategies are both locally grounded and globally informed.

4.6 Chapter Summary

This chapter verifies the importance of indigenous knowledge systems in coping with climate change through the application of traditional weather forecasting practices, efficient water management techniques and traditional farming practices which have been proven to be effective. Although IKS is a common practice its widespread use remains hindered due to lack of institutionalization and modernization of these systems. The research results indicate the applicability of IKS across the world confirming its sustainability benefits. Therefore integration of indigenous knowledge systems with science-based methods promotes climate change adaptability

CHAPTER FIVE: SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

This chapter is aimed at providing a comprehensive analysis of the results obtained for Indigenous Knowledge Systems in the context of climate adaptation. This involves interpreting results obtained in Ward 27 within Zaka district in relation to other academic research and policies. Some of the issues that have been explored include community resilience, cultural heritage and policy-related challenges and possibilities within inter disciplinary study. The chapter will also focus on the strengths and weaknesses associated with the use of IKS to solve climate change.

5.2 Summary

The research findings showed that IKS play a critical role in climate change adaptation leading to sustainable adaptation efforts in Ward 27, Zaka District. Indigenous forecasting methods, water conservation methods, diversified crop farming, organic pest management and disaster management were identified as the basis of the adaptation efforts. The adaptation measures developed through trial and error and experience over many years are appropriate to local environmental conditions and sustainable. The research participants indicated that traditional forecasting is highly reliable since it has been accurate in predicting weather conditions. "The knowledge of our forefathers on interpreting the sky and movements of animals has helped them accurately predict rains," one participant remarked.

The efficacy of IKS approaches is dependent on the circumstances under which they are used and scalability issues. Contour farming and terracing are some of the approaches that have been commended for their ability to preserve soil moisture content and prevent erosion however these practices pose some difficulties when scaled up to cover large commercial farms. Likewise, indigenous food preservation techniques and seed saving practices have contributed to food security amid climate change-induced droughts nevertheless prolonged periods of drought may present some difficulties for these practices. According to Nyong et al. (2021), IKS approaches are very efficient when implemented at a community level but require proper institutional support for their expansion.

A framework of climate adaptation that includes stakeholders from Indigenous people, institutions and science is suggested by the study. As per respondents' policy should recognize climate adaptation by establishing support mechanisms that will protect and strengthen traditional ways of resilience. Mugabe and Mukamuri (2020) indicate that the absence of such recognition may render indigenous methods irrelevant despite their success. Capacity building initiatives aimed at reducing generational gap investments in infrastructure which would allow scaling up of indigenous practices and forums in which IKS and scientific knowledge merge were considered some of the important measures. It becomes evident that the inclusion of both traditional wisdom and innovation is necessary to build resilient communities. According to Berkes (2017), hybrid approaches that combine IKS with modern innovations lead to more robust and resilient models of climate adaptation. By increasing Indigenous people involvement in climate change policies, investing in documenting IKS and supporting collaborative approaches solutions developed in Ward 27, Zaka district will continue to be relevant in the future.

5.3 Conclusion

IKS offers locally contextualized options for coping with climatic changes in Ward 27 Zaka District as demonstrated by this research. While IKS face a number of difficulties including lack of institutional support and scalability it is crucial to note that IKS play an important role in ensuring resilience against climate change, especially in rural areas where tradition dictates how communities adapt to climatic variability. The adoption of a mixed approach of incorporating indigenous wisdom with climate science is identified as the most promising strategy in terms of effectiveness. In terms of the implementation of a mixed approach to climate adaptation, it is imperative to adopt a collaborative framework of governance that ensures the involvement of indigenous knowledge keepers in making policy decisions related to climate change. Increased institutional support for IKS could be achieved through strategic investments in education and research on IKS. As argued by both Berkes (2017) and Mugabe & Mukamuri (2020), the need for aligning climate policies with community solutions cannot be overlooked.

It should also be noted that the current study demonstrates the necessity of recording and preserving indigenous knowledge systems as an important step to protect them from degradation due to modernization and migration. Well-structured initiatives on recording oral traditions, knowledge about the natural environment, and various rituals through writing and digital media can provide necessary mechanisms of inter-generational knowledge transfer. As

stressed by Nyong et al. (2021), documentation plays an essential role both in preserving cultural heritage and increasing the validity of IKS within the framework of climate governance.

5.4 Recommendations

Recommendations have been made to enhance the use of climate-resilient adaptive strategies in Ward 27 of Zaka district. The government departments and agencies need to legitimize Indigenous Knowledge Systems as part of adaptation mechanisms and integrate them into the national and regional levels. Legislations must make provisions for the inclusion of traditional adaptation mechanisms while institutions must promote cooperation between indigenous communities, policy-makers, and scholars to facilitate good governance and sharing of knowledge. Capacity building activities and documentation of IKS are essential in ensuring sustained utilization of these systems. Locally initiated projects ought to document indigenous climate strategies through writing and technology by including them in school curriculums to ensure transmission of the strategies to future generations.

There is a need to explore the hybridization of adaptation models that incorporate both indigenous knowledge and innovations in scientific fields. The development stakeholders must promote partnerships across disciplines where indigenous knowledge can be blended with climate change science in order to enhance the efficacy of adaptation strategies. The fusion of indigenous predictions and scientific climate change models will lead to innovative responses that respond effectively to the local realities. Efforts must be made by policymakers to encourage research into the potential complementarities that exist between the two approaches to develop hybrid mechanisms that enhance resilience. Funding and infrastructure support will play an important role in scaling up indigenous farming and water conservation technologies. Investments will have to be made in the construction of irrigation and storage facilities as well as seed banks to increase food production and ensure food security.

Climate policy conversations need to include indigenous knowledge experts actively, as well, to foster inclusive models of governance tailored to their context. Climate policies should be drafted through participatory practices that consider indigenous worldviews throughout the process. Providing an avenue for traditional elders and community leaders to participate in adaptation initiatives would strengthen the efficacy and legitimacy of integrating indigenous knowledge systems into adaptation policies. Dialogue among community members and policy-makers would create sustainable models of adaptation grounded within local contexts. The

suggestions made would serve as a thorough guide to strengthening indigenous strategies for climate resilience through institutional mechanisms, inter-disciplinary collaboration and equitable policies.

5.5 Recommendations for Further Study

There are several additional avenues of research that can be pursued to better understand the role of IKS in climate adaptation. Comparing IKS methods of climate adaptation and those of modern science in various ecological zones within Zimbabwe will shed light on the efficacy of both methods. The study may indicate differences in the resilience levels achieved due to differences in climatic, soil, and agricultural conditions which will offer policymakers and farmers an understanding of how well each method works. An interesting topic of research would be the economic feasibility of adapting indigenous knowledge-based practices for climate change. A study into the business dynamics of indigenous agriculture can create a model that will not only improve economic incentives but also increase the resilience of crops against climate change.

It would also be helpful if longitudinal studies were conducted to determine the efficacy of IKS in terms of time as the effectiveness of the methods used may change with the changing climate patterns. For instance longitudinal study of indigenous communities applying their own adaptive methods will enable determination of trends regarding food security, water conservation and management of the ecosystems. In this case the effectiveness of traditional knowledge in dealing with various climatic changes can be established and gaps where reinforcement of these strategies is needed will emerge. The integration of IKS in technological devices used to monitor the climate is also an interesting area worth studying in the future. There could be investigations on how indigenous knowledge about predicting the weather can be applied in modern climate prediction through technological means.

These areas of research have opened doors to enhancing the IKS approach as well as maintaining its importance in future climate adaptation strategies. Through the incorporation of traditional knowledge and modern advances communities like Ward 27 in the Zaka district can formulate effective strategies that will protect their livelihoods and facilitate sustainable development.

5.6 Chapter Summary

This chapter discussed the role played by Indigenous Knowledge Systems in fostering adaptation strategies in Ward 27 of Zaka district. It is clear that traditional methods such as weather forecasting, water management, agricultural diversification, pest management and disaster preparedness are still important despite the obstacles of legitimacy and scalability. An integrated strategy that combines traditional knowledge and climate change science proved to be the best option. This chapter highlights the necessity of policy frameworks, documentation, training and stakeholder engagement to preserve Indigenous Knowledge Systems. Possible research areas in future include comparisons, sustainability tracking and technological applications.

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RESEARCH INSTRUMENTS

Annexure A: Interview Guide

Interview Guide: Harnessing Indigenous Knowledge for Inclusive Climate-Resilient Adaptation the Case of Ward 27, Zaka District

Greetings, my name is Tatenda Agnes Mandevere, a student at Bindura University of Science Education who is currently studying Disaster Management Sciences. As part of my study, I am required to carry out research whose success relies upon your cooperation and commitment in terms of answering the research questions. I am carrying out research which is titled "Harnessing Indigenous Knowledge for Inclusive Climate Resilient Adaptation the Case of Ward 27 Zaka District". I am kindly requesting you to answer all the questions that follow as honestly as possible. Please be aware that your participation in this study is entirely up to you and that no personal information will be shared with anyone. All the data gathered here will be utilized for scholarly purposes only and information assembled will be treated as secret. You have been selected to serve as a key informant in this study. You are allowed to seek explanation, extend your reactions or get clarification on pressing issues. Kindly note that there are no dangers or direct rewards related with this exploration, however your precise commitments will assist with building knowledge that will be utilized to shape future sustainable development interventions. Please do not mention your name or address during the interview.

SECTION A

Demographic Information of Participants

1. How old are you?

Age Distribution	Tick Appropriate Box
18-30 Years	
31-45 Years	
46-60 Years	
Above 60 Years	

2.What is your highest level of education?

Educational Background	Tick Appropriate Box
No Formal education	
Primary education	
Secondary Education	
Tertiary education	

3.Gender Composition

Gender Composition	Tick Appropriate Box
Male	
Female	

4 What is your position in the community?

Participant Category	Tick Appropriate Box
Indigenous Knowledge Holder	
Farmer	
Policymaker /Development Practitioner	
NGO/CBO Representative	
Community Member	

SECTION B

Understanding Indigenous Knowledge Practices and Climate Change

5.Years of experience in climate change Adaption

Years	Tick Appropriate Box
1-5 Years	
6-10 Years	
11-20 Years	
Above 20 Years	

6. What traditional or indigenous practices are used in your community to cope with drought, floods or other climate related challenges?

7. How were these practices passed down (for example, through elders, community meetings, ceremonies)?

8. Are their specific crops, livestock breeds, or farming methods that are part of your traditional knowledge system?

9.How do you think these indigenous methods have been in dealing with recent climate changes?

10 Have any traditional weather forecasting methods (for example, observing animals, plants, or celestial signs) been used here? How reliable are they today?

11 Are their specific crops, livestock breeds, or farming methods that are part of your traditional knowledge system?

12. How do you think these indigenous methods have been in dealing with recent climate changes?

13. Have any traditional weather forecasting methods (for example, observing animals, plants, or celestial signs) been used here? How reliable are they today?

SECTION C

14. Integration With Modern Climate Adaptation Strategies

15.Have any government or NGO programs introduced modern climate adaption strategies in ward 27?

16.How do local people view these modern interventions compared to traditional methods

17. What challenges arise when trying to integrate traditional and modern knowledge systems?

SECTION D.

Inclusiveness and Participation

18.Who usually participate in community discussion about climate adaption (for example, men, women, elders)?

19. Do women and youth have opportunities to share their indigenous knowledge or idea.

20. What barriers exist that might exclude certain groups from contributing to adaption planning or decision making?

21. How can adaptation strategies become more inclusive in this community?

SECTION E

Institutional and Policy Support

22 What roles do local leaders (chiefs, headmen, councillors) play in promoting indigenous knowledge?

23. What kind of support does the community need from the government, NGOs or other stakeholders to strengthen indigenous climate resilience?

SECTION F

24.Reflections and Recommendations

25. In your view, what are the strengths of using indigenous knowledge for climate adaptation?

26. How can indigenous knowledge be better documented, preserved, and shared for future generations.

27. What recommendations would you make to improve climate resilience in Ward 27 using both traditional and modern approaches?

SECTION G

Closing

28. Is there anything else you would like to add that we have not discussed?

29.Do you have any suggestions on how researchers can work respectfully with communities on indigenous knowledge issues?

This marks the end of the interview.

I THANK YOU FOR YOUR VALUABLE TIME AND CONTRIBUTION!

ANNEXURE B Observation Checklist

A. General Community Profile

Aspect	Observation Indicators	Comments / Notes
Settlement Patterns	Distribution of homesteads, proximity to fields and water sources	
Land Use	Types of land use (cropland, grazing land, forest, wetland.)	
Infrastructure	Presence of roads, schools, clinics, irrigation facilities	

B. Evidence of Indigenous Knowledge in Practice

Aspect	Observation Indicators	Comments/Notes
Farming methods	Mixed cropping, intercropping, use of organic manure, traditional crop varieties	
Soil and water conservation	Terracing, contour ridges, mulching, use of wetlands, planting of trees	
Livestock Management	Indigenous breeds, traditional disease control methods, grazing patterns	
Weather Forecasting	Use of signs (animals, birds, plants, stars, wind pattens)	
Seed preservation	Traditional seed storage structures, seed selection and exchange practices	
Energy and natural resource use	Traditional fuel sources, conservation of firewood, use of indigenous tress	

C. Indicators of Climate Change Impacts

Aspect	Observation Indicators	Comments /Notes
Water Sources	Draying of rivers, dams or wells, community adaption (Wells and Boreholes)	
Vegetation	Change in plant species, deforestation levels, invasive species	
Soil	Evidence of erosion, fertility decline or siltation	

D. Inclusiveness in Adaptation Practices

Aspect	Observation Indicators	Comments/ Notes
Gender Participation	Men, Women and youth involvement in farming or conservation activities	
Decision Making	Who leads or participates in adaption meetings or local committees	
Knowledge Sharing	Platforms for exchanging traditional knowledge (meetings, rituals, trainings)	
Social Support Systems	Cooperative work groups, communal fields, traditional safety nets	

E. Integration of Indigenous and Modern Approaches

Aspect	Observation Indicators	Comments/Notes
Use of modern Inputs	Presence of hybrid seeds, fertilizers or irrigation equipment	
Adaptation Projects	NGO or government led initiatives observed in the area	
Blended Practices	Evidence of combining traditional and scientific methods	
Community acceptance	Visible participation and ownership of introduced methods	

F. Governance and Institutional Support

Aspect	Observation Indicators	Comment / Notes
Leadership involvement	Role of chiefs, headmen, councilors in adaption activities	
By laws and rules	Traditional or local rules governing resource use	
Collaboration	Interaction between local authorities, NGOs and community members	

G. Overall Reflections

Aspect	Observation Indicators	Comments/ Notes
Community Resilience	Visible coping mechanisms, community spirit help initiatives	
Challenges observed	Barriers to adaption, resource constraints, environmental degradation	
Best Practices	Successful indigenous strategies or innovation observed	

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BINDURA UNIVERSITY OF SCIENCE EDUCATION

01 DECEMBER 2025

To Whom It May Concern:

This is to confirm that **TATENDA AGNESS MANDEVERE**, Registration Number **B221805B** is a student doing a Bachelor of Science Honours Degree in Disaster Management Sciences in the Disaster Risk Reduction Department at Bindura University of Science Education and is required to do a Research Project as part of her Degree programme. The student is expected to gather data for her project from various sources including your institution.

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

HARNESSING INDIGENOUS KNOWLEDGE FOR INCLUSIVE CLIMATE RESILIENT ADAPTATION, THE CASE OF WARD 27, ZAKA DISTRICT.

Thank you.

EMMANUEL MAVHURA (PhD)
CHAIRMAN

RECEPTION
ZAKA RURAL DISTRICT COUNCIL
22 JAN 2026
P.O. BOX 500
JERERA