

BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCES

DEPARTMENT OF NATURAL RESOURCES

**THE CONTRIBUTION OF WETLANDS IN SUPPORTING RURAL LIVELIHOODS
AND POVERTY ALLEVIATION IN BINDURA. A CASE STUDY OF GUNYERE
WETLAND.**



BY

MAROVAHOPO IRENE

B212553B

**A DISSERTATION SUBMITTED TO BINDURA UNIVERSITY OF SCIENCE
EDUCATION IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE
BACHELOR OF SCIENCE HONOURS DEGREE IN NATURAL RESOURCES
MANAGEMENT.**

SUPERVISOR: MS C. MASONA

JUNE 2025

B212553B CHAPTER 1-6 FINAL.docx

ORIGINALITY REPORT

12%

SIMILARITY INDEX

9%

INTERNET SOURCES

5%

PUBLICATIONS

5%

STUDENT PAPERS

Submission date: 05-Jun-2025 08:52PM (UTC+0300)

Submission ID: 2687669453

File name: B212553B_CHAPTER_1-6_FINAL.docx (478.98K)

Word count: 10622

Character count: 64804

APPROVAL FORM

The dissertation title is “The contribution of wetlands to rural livelihoods and poverty alleviation in Bindura, a case study of Gunyere wetland” by Irene Marovahopo with registration number B212553B. The prerequisites for the award of the Bachelor of Science Honors Degree in Natural Resources Management have been reviewed and approved for this dissertation.

Supervisor’s Name: MS C MASONA

Supervisor’s Signature.....



Date ...13...../.....10...../...2025.....

DECLARATION

This dissertation titled “The Contribution of wetlands in supporting rural livelihoods and poverty alleviation in Bindura, a case study of Gunyere wetland” is my original work and I, Irene Marovahopo attest to that. All sources used have been formally acknowledged.

DEDICATION

With this work, I honor my family whose steadfast support and encouragement has been the cornerstone of my academic career. This study was driven by the determination and environmental consciousness of Bindura rural residents, particularly those who depend on Gunyere wetland for their livelihoods.

ACKNOWLEDGEMENTS

I want to sincerely thank my supervisor Ms MASONA with all the helpful advice and criticism during this research. We are specifically grateful to Gunyere local individuals and representatives of the Environmental Management Agency (EMA) for kindly sharing their time and knowledge. I am also grateful to my family for their understanding and patience throughout the research, as well as my friends for their support and encouragement. Without these combined efforts everyone made, this research couldn't be done.

ABSTRACT

This study aimed to address the multifaceted roles of wetlands in supporting rural livelihoods and poverty alleviation. Wetlands in Zimbabwe are important for increasing agricultural output, offering ecosystem services and protecting water supplies among other functions. This research investigates the contribution of wetlands in Bindura to rural livelihoods and poverty reduction, with an emphasis on Gunyere wetland in ward 10. This study explores ramifications of sustainable management and importance of Gunyere wetland services to local households' income generation, food security and climate variability resilience. The objectives include, to identify various ecosystem services offered by Gunyere wetland, to evaluate the contribution of socio-economic benefits of Gunyere wetland to local household income and to investigate challenges local communities face in managing wetlands sustainably while addressing poverty. To achieve the goals the research involved the use of a mixed-methodology approach that includes surveys, interviews, group discussions and field observations. Key findings indicated the potential role of wetlands in generating household income, increasing food security and reducing poverty, particularly from wetland agricultural activities. Key findings also indicated the provision of multiple benefits beyond direct resource use. The wetland's biodiversity supports agricultural productivity by enhancing soil fertility and pest control through natural predator species. This helps improve crop yields and reduces reliance on chemical inputs. Additionally, the wetland also acts as a natural buffer against extreme weather events by mitigating floods and regulating local microclimates, which in turn protects farmlands and settlements. Women and marginalized groups actively engage in harvesting medicinal plants and wild fruits, contributing to household nutrition and health. The role of the wetland in groundwater recharge is critical in sustaining water supplies during dry seasons, supporting both human consumption and irrigation. Furthermore, the presence of diverse animal species promotes ecological balance, helping to control pests and support pollination essential for food crops. Overall, these findings underscore the multifaceted contributions of the Gunyere wetland to environmental health, socio-economic development, and climate resilience in the local community. However, barriers like overexploitation and encroachment place these benefits' sustainability under threat. This study concluded that wetlands are crucial ecosystems that provide various benefits improving socio-economic well-being of the society. Recommendations include, improved market access, infrastructure development, education and livelihood diversification to ensure integrated strategy towards sustainable use of wetlands.

Table of Contents

APPROVAL FORM	i
DECLARATION	ii
DEDICATION	iii
ACKNOWLEDGEMENTS	iv
ABSTRACT	v
LIST OF TABLES	viii
LIST OF FIGURES	ix
LIST OF ACRONYMS AND ABBREVIATIONS	x
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background of Study	1
1.3 Statement of problem	3
1.4 Aim:	4
1.5 Research Objectives:	4
1.6 Research Questions:	4
Hypothesis Test 1	5
CHAPTER TWO	6
LITERATURE REVIEW	6
2.1 Introduction	6
2.2 Ecological functions of wetlands	6
2.2.1 Biodiversity Support	6
2.2.2 Water Regulation and Soil Erosion Prevention	7
2.2.3 Carbon Sequestration	7
2.2.4 Climate Regulation	8
2.2.5 Water Purification, Nutrient and Toxic Retention	8
2.3 Socio-economic Contributions of Wetlands	8
2.4 Challenges in wetland management:	9
2.5 Policies and Regulations Related to Wetland Management	10

CHAPTER 3	12
3.1 Description of Study Area.....	12
3.2 Research Design.....	14
3.3 Target Population.....	15
3.4 Sample Size.....	15
3.5 Sampling Technique	16
3.6 Data Sources	16
3.6.1 Primary Data	16
3.6.2 Secondary Data	16
3.7 Research Instruments	17
3.7.1 Questionnaires.....	17
3.7.2 Interviews.....	17
3.7.3 Field Observations	17
3.7.4 Focus Group Discussions.....	17
3.8 Ethical Considerations	18
3.9 Data Presentation	19
3.10 Data Analysis	19
CHAPTER 4	20
RESULTS	20
4.1 Demographic Information.....	20
4.2 Ecosystem services provided by Gunyere wetland.....	21
4.2.1 Ecosystem provisioning services	21
4.2.2 Gunyere wetland regulating services	21
4.2.3 Gunyere wetland supporting services	22
4.3 Socio-economic benefits of Gunyere wetland to household income	23
4.3.1 Socio-Economic benefits	23
4.3.2 Types of crops cultivated in the wetland.....	24
4.3.3 Monthly Income obtained from wetland related farming outputs	25

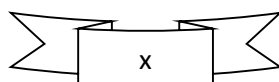
4.3.4 Hypothesis Test 1.....	25
4.4 Challenges faced by the rural community in managing wetlands sustainably.....	26
4.4.1 Hypothesis Test 2.....	26
4.5 Suggestions to enhance sustainable wetland management and livelihoods	27
CHAPTER 5	28
DISCUSSION OF RESULTS.....	28
5.1 Ecosystem services provided by Gunyere wetland.....	28
5.2 Socio-economic benefits of Gunyere Wetland to local household income.	30
5.3. Identified constraints in the management of the Gunyere wetland.....	32
5.4. Suggestions to enhance sustainable wetland management and livelihoods in Gunyere Village.	33
CHAPTER 6	34
CONCLUSION AND RECOMMENDATIONS.....	34
6.1 Conclusion	34
6.2 Recommendations.....	35
REFERENCES	36
APPENDICES	43

LIST OF TABLES

Table 3.1: Distribution of respondents.....	15
Table 4.1: Demographic Information of participants	20
Table 4.2: Plants and animals species identified in the wetland and their purpose.	22
Table 4.3: Types of crops grown in the wetland.....	23
Table 4.4: Chi-Square tests results.....	24
Table 4.5: Chi-Square tests results.....	27
Table 4.6: Suggestions for sustainable wetland management and livelihoods.....	27

LIST OF FIGURES

Figure 3.1: Gunyere wetland map.....	13
Figure 3.2: summary of research methodology	14
Figure 4.1: provisioning services offered by Gunyere wetland.....	21
Figure 4.2: regulating services.....	22
Figure 4.3: economic benefits of the wetland local households	24
Figure 4.4: Monthly income of wetland farming.....	25
Figure 4.5: challenges faced by the local community.....	27



LIST OF ACRONYMS AND ABBREVIATIONS

CBNRM	Community Based Natural Resources Management
CBD	Convention on Biological Diversity
DDC	District Development Coordinator
EIA	Environmental Impact Assessment
EMA	Environmental Management Agency
IBM	International Business Machines Corporation
NGOs	Non-Governmental Organizations
NTFPs	Non-Timber Forest Products
RDC	Rural District Council
SPSS	Statistical Package for Social Sciences
ZIMSTAT	Zimbabwe National Statistics Agency

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

One of the most generative ecosystems on Earth includes wetlands and they serve as crucial interfaces between terrestrial and aquatic environments. Wetlands provide essential services that support both ecological health and human livelihoods (Millennium Ecosystem Assessment, 2005). In numerous regions across the globe, wetlands are important sources of food, water and income. They support fisheries, agricultural productivity, grazing pastures, direct resource extraction and offer recreational opportunities that bolster local economies (Pant et al., 2015). Furthermore, wetlands play a significant role ecologically in climate regulation, toxic retention, water storage, carbon sequestration and flood mitigation contributing to broader environmental sustainability (Zedler & Kercher, 2005). However, wetlands face increasing threats from anthropogenic activities including urbanization, agricultural expansion and climate change (Lv et al., 2021). These pressures not only lead to degradation of wetland ecosystem but also threatens the livelihoods of millions of people who depend on them. As wetlands decline, so too does the economic and social fabric of rural communities exacerbate poverty and food insecurity.

All over the world, nations are facing increased pressure to provide for their livelihood's specific needs of their growing populations, because of climate change (Přívára and Přívarová, 2019.). This often leads to misuse of natural resources and resultant encroachment on sensitive habitats, including wetlands (Ahmad et al., 2024). The Ramsar Convention on Wetlands of 1971, outlines various threats to wetlands particularly climate change, pollution and invasive species (Ramsar Convention on wetlands 2018). Wetlands are threatened by the over-exploitation of the products, services, and functions they provide, despite their crucial contribution to sustaining agriculture and supporting human settlements (Mo, 2016). This unsustainable use compromises wetland health, reducing their ability to maintain livelihoods and ecosystem balance.

Most of the population in Africa (estimated to be approximately 1 billion) live in rural areas, where they engage in smallholder subsistence farming and agriculture. However, the lack of access to necessities such as water and food has perpetuated poverty for many people (Binns et al, 2011). Farming accounts for about 70% of rural households' income in Africa (Davis et

al. 2010). Livestock rearing, fishing, small-scale farming and non-farming activities are some usual approaches used in rural inhabitants to generate income (Mphande, 2016). Wetlands have been recognized for several decades as essential ecosystems in supporting people's livelihoods because they provide food and water, especially for individuals residing in arid and semi-arid regions (Zdruli and Zucca, 2023). During dry spells, wetlands also serve as important sources of grazing land for pastoralists and farmers.

In Zimbabwe poverty is largely in rural areas (Makombe et al., 2024.). Zimbabwe is currently facing food shortages, low income due to climate's variable nature (Ndlovu and Mafuratidze, 2024.). An estimated number of 6 million people are expected to be food insecure both in urban and rural areas by 2025, as a result, 42% Zimbabwe's population lives in extreme poverty (Matanga and Muridzo, 2025). Due to increased climate variability and extreme weather events people are facing increased droughts, shortage of water and food thereby threatening their livelihood. Wetlands assist in supporting livelihoods and alleviating poverty, however, rural communities are facing challenges in managing these resources particularly, as a result of massive degradation from agriculture and grazing of livestock. One of the biggest threats Zimbabweans faces is climate variability and it has major effects on livelihoods and food security increasing poverty (Ndlovu et al., 2022.).

Despite the critical role that wetlands play in supporting livelihoods, they are often overlooked in policy discussions and development agendas, and this highlights the need for further comprehensive research that evaluates the multifaceted contributions of wetlands to poverty reduction and sustainable development (Samiee-Zafarghandy, 2023). The purpose of this study is to investigate the function of Gunyere wetland in supporting rural livelihoods specifically in Gunyere village, while examining the challenges they face managing the resources. By examining the ecosystem services, economic activities and the social and cultural values, this study seeks to provide a holistic understanding of wetlands' significance.

1.2 Justification

Wetlands are important ecological systems that provide numeral benefits to rural communities, including food security, income generation and cultural values. However, they are often under threat from urbanization, pollution and climate change. Understanding their role in supporting livelihoods can inform sustainable management practices and contribute to poverty reduction efforts. This study is essential for ensuring that wetlands are preserved and utilized effectively to benefit vulnerable populations.

This study will have significant implications for various stakeholders including citizens (local communities), agriculture community, policy makers, environmental agencies and NGOs. The findings will help local communities understand the importance of wetlands as essential source of food security and revenue, by raising awareness about the sustainable utilization of wetlands, the study can empower households to better manage these resources, thereby improving their livelihoods and resilience against environmental challenges. It will also highlight other sources of food and income during periods of crop failure or economic difficulty. It is essential for farmers and agricultural workers; this study will demonstrate how wetland resources can complement traditional agriculture. By integrating wetland products into their livelihood strategies, the agricultural community can diversify income streams and improve food security.

The study will also provide insights into sustainable agricultural practices in wetland areas, minimizing environmental degradation while maximizing productivity. Policymakers should take note of this study as it will provide important information about the nutritional and economic benefits of wetlands for rural households (Verma, M. and Negandhi, D., 2011). This data can inform policy development around wetland conservation, rural development, and poverty alleviation. Environmental agencies will benefit from the study by gaining a deeper understanding of the human-ecological interactions within wetland ecosystems. This research will highlight the need for integrating local livelihood needs with conservation efforts, promoting a more holistic approach to ecosystem management that ensures the protection of wetlands while supporting human well-being. It will give light to non-governmental organizations and development agencies involved in rural development, food security, and environmental conservation can use the study's findings to design more effective programs.

1.3 Statement of problem

Rural areas face acute challenges of poverty and sustainable resource management. The persistent poverty is closely linked to the degradation of natural resources, including wetlands. Poor management and access to markets not only limits livelihood opportunities but also increases vulnerability to environmental shocks, thereby reducing resilience of rural households (Baumann, 2002). Wetlands are under increasing threat due to climate change and competing land uses such as agriculture, mining and housing developments. The demand for land has resulted to degradation of wetland areas contributing to the depletion of water tables, pollution, habitat loss and a decline in biodiversity (Lizias and Felix, 2013). Political interference, inadequate enforcement of environmental regulations and limited public awareness further exacerbate these problems, undermining efforts to protect and sustainably

manage wetland areas (Sanchirico et al., 2002.). Sustainable management of wetlands is therefore important, not only for environmental conservation but also as a pathway to improve livelihoods and alleviation poverty.

Despite the important role that wetlands play in supporting rural livelihoods, they are often overlooked in local development agendas (Lizias and Felix, 2013). There is a need to take a closer look at how Gunyere wetland enhance rural livelihoods and alleviate poverty, also addressing environmental challenges the wetland face. This research diligently seeks to cover a gap by assessing the contribution of wetlands to agrarian incomes and poverty reduction in Gunyere Village, highlighting the urgent need for integrated community-driven approaches to wetland management to balance both ecological sustainability and socioeconomic development (Baumann, 2002).

1.4 Aim:

The goal of this study is to explore the multifaceted role of wetlands in supporting rural livelihoods and identify pathways for enhancing their contribution to poverty reduction.

1.5 Research Objectives:

To identify various ecosystem services provided by Gunyere wetland.

To evaluate the contribution of socio-economic benefits of Gunyere wetland to local household income.

To investigate challenges faced by rural communities in managing wetlands sustainably while addressing poverty.

1.6 Research Questions:

- i. What ecosystem services do wetlands provide that directly support rural livelihoods?
- ii. In what ways do local communities utilize wetland resources for economic activities?
- iii. What challenges do rural communities face in managing wetlands sustainably?
- iv. What strategies can be implemented to improve sustainable utilization of wetlands in supporting rural livelihoods and poverty reduction.

1.7 Hypothesis

Hypothesis Test 1

H₀: There is no difference between men and women in utilizing Gunyere wetland resources in income generation.

H₁: There is a significant difference between man and women in utilizing Gunyere wetland resources in income generation.

Hypothesis Test 2

H₀: There is no significant association between the type of challenge and the frequency with which it is perceived as a barrier.

H₁: There is a significant association (some challenges are perceived as barriers more often than others).

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter looks into the existing scholarship review on the contributions of wetlands to rural communities. Wetlands are crucial ecosystems that provide a myriad of services essential for sustenance of rural livelihoods and the alleviation of poverty. This review encompasses various ecological functions of wetlands, socio-economic significance and challenges faced in their management. By examining the previous studies and identifying existing knowledge gaps, this review aims to pave a way for a comprehensive understanding of the threats wetlands face and their significance. Existing literature provides valuable insights into the economic benefits and cultural significance of wetlands.

2.2 Ecological functions of wetlands

According to the Ramsar Convention, wetlands are areas where water is either at or near the surface of the soil including marshes, swamps, bogs, and floodplains depth of which does not exceed 6m. These ecosystems are characterized by their unique hydrological condition, which support a wide variety of animal and plants species that flourish in waterlogged soils. Wetlands are important for capturing carbon, purifying water, controlling floods and preserving biodiversity. In Zimbabwe, seven Ramsar sites are recognized as wetland of international significant. The Ramsar Convention reveal the capacity of wetlands in offering valuable services and ecological balance to nature and human communities thereby enhancing their protection and sustainable management. They serve several ecological functions;

2.2.1 Biodiversity Support

Wetlands are amazing ecological communities that support various microbial life, plants and animal species around the world (Qiu et al., 2024). As a result, they play a crucial role in maintaining ecological functions that support biodiversity conservation. They provide habitat for numerous species that is the flora and the fauna, many of which are endemic, and this contributes to ecosystem stability and resilience (Qiu et al., 2024). Biodiversity, including, microbes, plants and animals regulates biogeochemistry in wetlands (Reddy et al., 2022). Habitat heterogeneity within wetlands creates diverse microhabitats thereby promoting high level of species richness and ecosystem resilience. Wetlands are home to numerous animal species such as, birds (waterfowl, shorebirds and raptors), fish, amphibians, reptiles and also

invertebrates (Qu et al., 2023). For example, the Banganga wetlands in Uttarakhand, India, is a treasure to many plants and animal species, they boast 19 species of aquatic plants, 25 in inundated shores and 27 in the uplands, species like *P. barbaratum*, *I. carnea*, *P. karka* and *T. elephantina* living in all habitats. (Adhikari and Babu, 2008). High species diversity enhances ecosystem functioning, allowing wetlands to maintain essential processes such as nutrient cycling, water purification and habitat provision. According to Mitsch and Gosselink (2015), wetlands support a wide range of organisms, contributing to biodiversity conservation.

2.2.2 Water Regulation and Soil Erosion Prevention

Wetlands support the hydrological cycle by regulating the water flows and maintaining water quality (Nayak and Bhushan, 2022). They act as natural buffers against floods and droughts, which are vital for both wildlife and rural communities reliant on agriculture. Many rural communities in Zimbabwe where water scarcity severely affects agricultural productivity, wetlands serve as crucial reservoirs that support crop growth during drought conditions (Wang et al., 2015). According to Zedler and Kercher (2005), wetlands improve groundwater recharge and reduce surface run-off which is essential for agriculture irrigation and drinking water supplies. Wetland plants slow down flood water, they also assist in trapping silt and sediments, thereby protecting riverbanks (Nayak and Bhushan, 2022). This also ensures that the river flows are maintained for longer periods. Wetland vegetation also shields the soil from damage by strong waves and wind.

2.2.3 Carbon Sequestration

Various studies and reviews implemented by analysts globally reveal the important functions of wetlands as carbon sinks, as they effectively store significant amounts of carbon in their soils and biomass. According to Chmura et al. (2003), wetlands can store carbon at rates up to 10 times higher than upland ecosystems. According to the World Resources Institute, it is estimated that about 17% of world total blue carbon is stored in Indonesia's marine wetlands and estuarine. In Louisiana's coastal wetlands, 63% of total carbon sequestered rely on the vertical growth of marshes (DeLaune & White, 2012). This capacity for carbon sequestration is vital in mitigating climate change, which in return disproportionately affects rural communities dependent on natural resources (Moomaw et al., 2018). For example, plants in wetlands, such as reeds and sedges absorb carbon dioxide (CO₂) during photosynthesis. When these plants die, their biomass decomposes slowly in waterlogged conditions, resulting in the accumulation of organic carbon in the soil. This process is significantly slower than in terrestrial ecosystems, allowing wetlands to store large amounts of carbon over time (Mitsch &

Gosselink, 2015). Carbon sequestration also is important in mitigating climate change by reducing the atmospheric carbon dioxide. This process is essential for achieving global climate targets, particularly in developing countries, where communities are vulnerable to climate impacts (Ramsar Convention Secretariat, 2013). This is also vital for agricultural productivity and food security.

2.2.4 Climate Regulation

Wetlands influence local microclimates by regulating humidity and temperature (Zhu et al., 2023). The presence of water and vegetation increases humidity levels leading to cooler conditions as compared to adjacent uplands. Their water bodies moderate temperature fluctuations thereby creating a more stable environment for agriculture, allowing farmers to grow a wider variety of crops and improving overall agricultural productivity (Zedler & Kercher, 2005). This is beneficial to rural communities for agricultural purposes. By maintaining humidity levels, wetlands enhance crop resilience to heat stress and other climate-related challenges (Schneider et al., 2020).

2.2.5 Water Purification, Nutrient and Toxic Retention

Wetlands vegetation is important and is essential for cleaning up water, as it absorbs harmful substances and nutrients from water that flows into it, enhancing the quality of downstream water (Sharma et al., 2021). These harmful substances and nutrients often come from different sources, including industries, agriculture and households. As the water keep moving through the watershed, wetland plants substantially filter out toxins and nutrients, resulting to cleaner safe water (Kumwimba et al., 2021). Wetlands trap sediments, thereby protecting resources in the downstream such as farmlands, rivers, lakes and dams from being suffocated with silt (Skagen et al., 2008). Moreover, sediment retention in floods plains enhance agriculture because it replenishes nutrients and also enrich the soil (Gordon et al., 2020).

2.3 Socio-economic Contributions of Wetlands

Wetlands directly and indirectly support rural livelihoods through various socio-economic avenues;

Wetlands enhance agricultural productivity through irrigation and nutrient cycling (Messer et al., 2021). They provide fertile soils and moisture that are crucial for crop cultivation, especially during dry seasons. Wetland agriculture, characterized by low-impact cultivation methods can enhance local incomes while preserving ecosystems, thus supporting rural development (Ranjan, 2021). According to Kalisa et al, 2013, wetlands provide livelihood

options in regions like Songwe River Basin and Tanzania where 81.7% of the population relies on wetland resources for farming particularly in rice production. In Nepal, households around Ghodaghodi Lake derives 12.4% of their total income from wetland resources, including agricultural products (Lamsal et al., 2015). Studies indicate that wetlands significantly increase crop yields, thereby improving food security and reducing poverty (Nwankwoala, 2016).

Rural tourism development leverages wetland resources to create job opportunities and promote conservation, emphasizing the importance of strategic marketing in attracting visitors to these areas. For example, ecotourism is emerging as a significant economic opportunity in wetlands in Iran's Zarivar wetland where local engagement in conservation efforts is essential for sustainable tourism development (Aazami & Shanazi, 2020). As a result, the integration of tourism with conservation efforts can enhance livelihoods while preserving wetland ecosystems.

Wetlands significantly support fishing practices. Sustainable fishing practices are crucial for maintaining fish populations and the health of wetland ecosystems, ensuring food security and livelihoods for local communities. Fishing is a vital source of income, for example, in Koshi Tappu Wildlife Reserve, 54% of surveyed respondents engage in fishing, highlighting its economic importance (Joshi, 2018). Moreover, in Assam, wetlands significantly support local fisheries thereby sustaining thousands and contributing to local economy (Ghosh et al., 2024). The interdependence between wetlands and fisheries underscores the need for integrated management approaches that consider both ecological and economic factors, fostering a holistic understanding of rural economies. This illustrates the potential of wetland resources to drive sustainable economic growth in rural areas through agriculture, fishing and tourism.

Wetlands also hold important cultural and spiritual significance for many communities, and they are considered as sacred (Metwane, 2023). They are often sites for traditional practices, ritual and community gatherings. These cultural ties contribute to social cohesion and also enhance community resilience (Emerton, 1998). For example, in most part of Zimbabwe spirit mediums (an institution that is revered culturally) are believed to govern access to and use of wetlands.

2.4 Challenges in wetland management:

Wetland management face significant challenges due to anthropogenic pressures and climate change impacts. Population growth leads to urbanization and agriculture expansion leading to habitat fragmentation and degradation of wetland ecosystems through drainage and

construction and also the introduction of invasive species which disrupts natural wetland functions (Fan and Li, 2025). According to Savanhu, 1998, degradation became evident in the form of badlands and cultivated wetlands. Limited knowledge among local communities about the benefits of wetlands hampers effective governance and management strategies (Matovu et al., 2023).

Climate variability impacts ecosystems, physical characteristics and biogeochemistry of floodplains in different ways (Chikodzi and Mapfaka, 2018). It alters temperature and precipitation patterns, which result in increased flooding, droughts, saltwater intrusion threatening ecosystem services of wetlands. For instance, marine aquatic beds struggle with high salination while mangroves and salt marshes struggle with rising sea levels (Wang and Gu, 2021). Changes in precipitation patterns and rising temperatures can shift wetlands from carbon sinks to sources thereby exacerbating greenhouse gas emissions (Scholz, 2024). As a result, Climate change affect wetlands by reducing their size, permanence, increasing salinity, disrupts biodiversity and contribute to the loss of stored carbon, causing serious challenge in the fight against global warming (Erwin, 2009).

Additionally, water pollution from agricultural runoff diminishes water quality and ecosystem resilience making wetlands more susceptible to invasive species that disrupts native biodiversity. According to Liu et al. (2004), the research revealed that in small Shanjiang plains (China), changes in land use often driven by industrial and agricultural activities led to land reclamation and fragmentation, resulting in a significant decline of the wetlands and forest areas and an increase in paddy land. As a result, the integrity of these factors complicates conservation efforts, as habitat fragmentation isolates wetland areas, reducing their ecological integrity and ability to support diverse species.

The interplay between climate change and human activities complicates management efforts, necessitating integrated approaches to address these multifaceted challenges (Mkonda, 2022). Effective management strategies must address these interconnected threats to maintain the ecological functions and biodiversity of wetland ecosystems.

2.5 Policies and Regulations Related to Wetland Management

Effective wetland management is crucial for conserving the vital ecosystems and to ensure that they continue to provide essential services to rural communities. Several international agreements guide wetland management globally (Smardon and Smardon, 2009). For example, we have the Ramsar Convention and Convention on Biological Diversity (CBD). Ramsar

Convention established in 1971, is a primary international treaty dedicated to the conservation and sustainable use of wetlands (Matthews, 1993, March). Countries are urged to allocate Ramsar sites, so as to promote conservation efforts (Ramsar Convention Secretariat, 2013). The CBD recognizes the importance of wetlands as they provide habitats for many species and encouraging countries to implement conservation strategies that protect these ecosystems (Sadiki et al., 2024).

National policies that govern wetland management in Zimbabwe include, Environmental Management Act (2002), Water Act (1998) and National Biodiversity Strategy and Action Plan (Mandishona and Knight, 2022). Environmental Management Act provide legal framework for the protection and sustainable use and management of natural resources. This includes wise use of wetlands through the establishment of Environmental Impact Assessment (EIAs), as it encourages public participation in decision-making processes related to land use and resource management (Tekaligne, 2003). The Water Act regulates the use and management of water resources also ensuring the importance of wetlands in promoting water quality and quantity (Matamanda et al., 2018). Biodiversity policies promote wise use of nature resources and the incorporation of biodiversity into various sectors, including agriculture and forestry sector.

Local regulation includes the CBNRM (Community-Based Natural Resources Management) and local governance structures such as chiefs. Community-Based Natural Resources Management programs support local communities to sustainably manage nature resources, by involving them in decision-making and resource management. These programs enhance the protection of wetlands while providing economic benefits through sustainable use practices, such as ecotourism and sustainable harvesting (Zaiton et al., 2019). Local governance structures also play a significant role in wetland management through establishing community committees and local environmental boards, communities can take ownership of wetland conservation efforts. These structures facilitate the development of local regulations that align with national policies while addressing specific local needs and challenges (Emerton, 1998).

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Description of Study Area

Gunyere Village is located in Manhenga area, Bindura District ward 10. This area experiences humid subtropical climate with dry winters. The area lies between latitude 17°23'40" S and longitude 31°15'58" E. It lies at an elevation of approximately 1,121 meters above the sea level and it experience annual temperatures averaging 23.9°C, with high daytime temperatures ranging from 25°C to 30°C in warmer months and it drops with 9°C in coldest months, particularly June and July (Risk, 2021). Rainfall is seasonal, with most precipitation occurring between November and March. Bindura district receives average annual rainfall from 750 to 1,050 mm, though it is prone to mid-season dry spells. Humidity is generally higher during the rainy season and this climate is suitable for intensive agriculture (Takavarasha et al., 2017). Vegetation consists primarily of miombo woodland with species composition that vary according to soil type. On heavier soils dominant tree species are *Brachystegia spiciformis* (Msasa), *Brachystegia boehmii* (Mpfiti), *Bauhinia macrantha* (Mpondo), *Afrormosia angolensis*. On ganitic soils *Brachystegia boehmii* is dominant with *Julbernadia globiflora* (Mnondo). Grass species are also prominent and this includes *Hyparrhenia spp* (thatched grass), *Heteropogon contortus* (spear grass) and *Sporobolus spp* (Maimba and Thebe, 2023). Soils in Gunyere range from sandy loams to heavy clays. These soils support both woodland and grassland vegetation making them suitable for variety of crops. This combination of climate, vegetation and soil types makes Gunyere Village well-suited for both crop and livestock farming, though land degradation and seasonal dry spells are significant challenges. According to the census report of 2022, ward 10 has a total population of 14 098 and 3 497 households (ZIMSTAT, 2022).

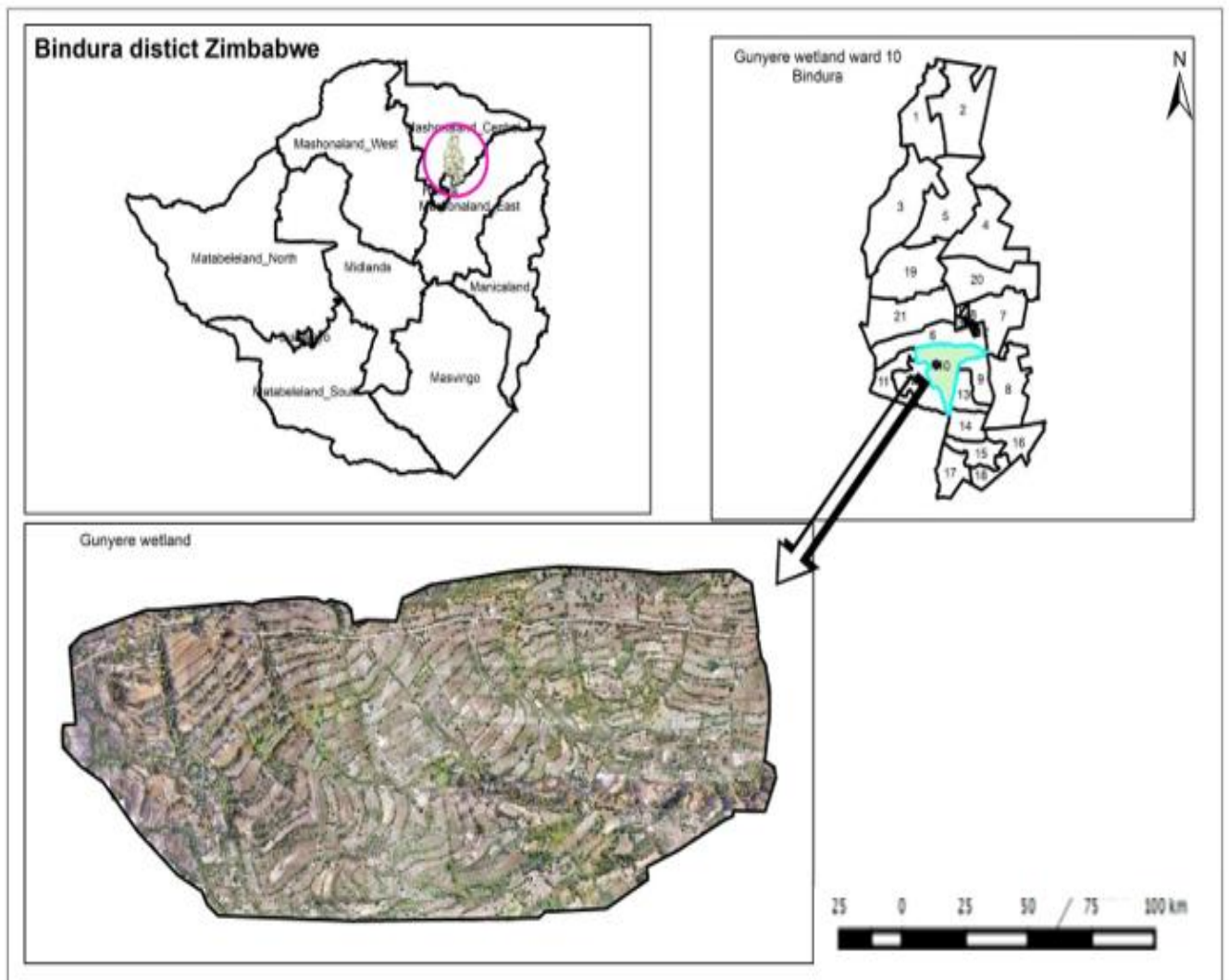


Figure 3.1 Gunyere wetland map

3.2 Research Design

The study applied a mixed methodology research design approach, including both qualitative and quantitative data collection and analysis as summarised in figure 3.1

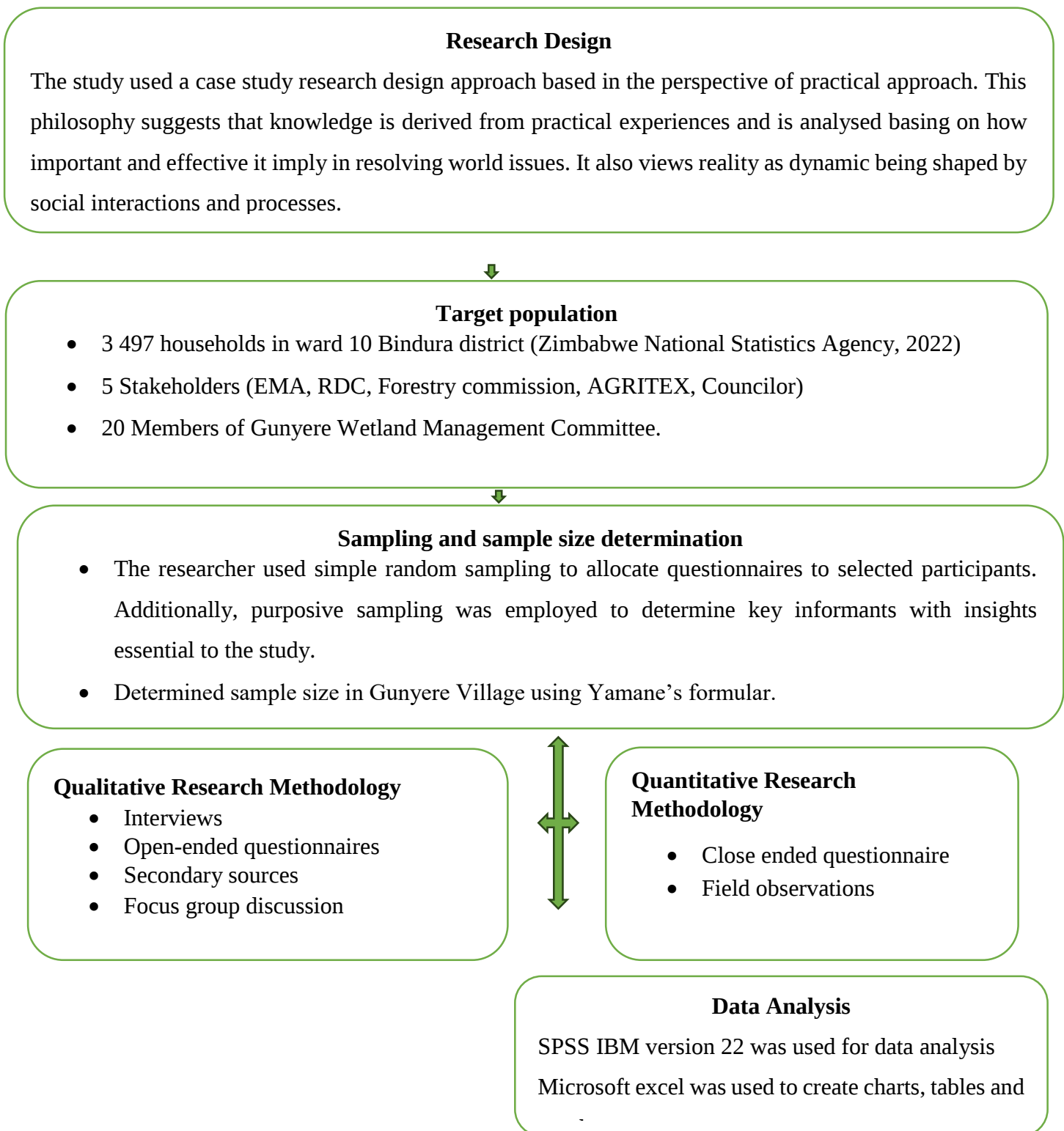


Figure 3.2: summary of research methodology

3.3 Target Population

According to the DDC office Bindura, each village is grouped with an average of 75 households. Therefore, the target population of this study consisted of 75 households residing near the wetland (Gunyere Village), local authorities and wetland management committees.

3.4 Sample Size

For this research, a sample size of 63 households who are primary residents in Gunyere Village was used together with 20 key informant interviews, with 10 from local authorities and 10 from Gunyere wetland management committee. Yaman formula was used to determine the sample size of households in Gunyere Village so as to come up with total questionnaires for the study. According to Adam (2020), Yamane (1967) formula is essential for determining the perfect sample size for the research questionnaires and it can provide 95% confidence level: $n = \frac{N}{1+N(e)^2}$

Given that, N -total population, where n -target population and e -precision (95% confidence level).

Table3.1: Distribution of respondents

Target Population		Total population size	Sample size determination formula used	Sampling Techniques used and justification	Sample size obtained
Households in ward 10	Ward and villages	Number of households in Gunyere village	$n = \frac{N}{1 + N(e)^2}$	Simple random sampling was used to select households in the village. This method ensures that each household is proportionally included, increasing the accuracy and generalizability of the findings.	Total households
675	9	75			63
Key informants (EMA, RDC, AGRITEX, Forestry Commission, Counciler)		10	NA	Purposive sampling and availability of members was considered.	10

Gunyere wetland management committee	20	N/A	Purposive sampling and availability of members was considered.	2
Total participants				75

3.5 Sampling Technique

The study employed simple random sampling technique. A total of 63 households in Gunyere Village were randomly selected. The researcher created a list of all households in Gunyere Village and assigned unique numbers to each figure from 1 to 75 (total number of households) using excel. 63 households were randomly picked from the list. Purposive sampling (judgemental) was used for key informant interviews. This involved the local authorities such as the community leader, Gunyere wetland management committee which involve representatives from Gunyere village representing their community and key stakeholders such as EMA, RDC etc. The study targeted these groups due to their skilled knowledge and specific roles in the wetland management in Gunyere. A total of 6 participants were interviewed during the process of data collection. The selected individuals were contacted and the interview was scheduled at appropriate time at a suitable location allowing for a detailed discussion on different aspects of the wetland ecosystem services. This contributed to gathering of meaningful data contributing to the study findings.

3.6 Data Sources

3.6.1 Primary Data

Primary data refers to knowledge that a researcher collect explicitly for a particular study. Primary data is collected through several ways, using self-administered surveys, field observations, interviews and experiments. Despite the fact that it is quite expensive and time consuming, it was suitable for collecting data in Gunyere wetland ward 10. It was collected on the demographics of respondents and their views on the contribution of wetlands in supporting rural livelihoods and poverty alleviation. The question was tuned to ensure that useful data was collected for use in the research.

3.6.2 Secondary Data

The data was collected using desktop analysis including online documents, journals and also internal tools that the researcher had access to during the time of data collection. Using secondary data is important for gaining valuable insights into the research being conducted and it helps in assessing if the study's objectives are realistic.

3.7 Research Instruments

3.7.1 Questionnaires

The research questionnaire included both the open-ended and closed-ended questions to capture a comprehensive range of data. This was done to collect detailed information in relation to the discussion. The closed-ended questions can give off a sense of detachment and bias, simply because they usually don't capture the logic behind thinking and they also limit choices of participants. Questionnaires allow respondents a chance to reason through their responses and answer without having pressure to respond immediately. They also help to reach participants who are not readily available, because individuals fill the questions at their own pace allowing a chance of availability for those that were not available. The use of questionnaire allows for greater synergy of responses, due to conformity of questions asked to all respondents. It is a cost-effective tool for data collection as compared to some tools.

3.7.2 Interviews

Key-informant interviews were used and it consisted both open-ended and close-ended questions. This can enable one to pursue inductive reasoning. The questions asked were in the same order so as to prevent significant variation in the responses. To ensure that the interviewee would talk freely and feel comfortable discussing the questions, they were reminded that their answers will remain anonymous. The interviews were placed both in Shona and English. Three distinct categories of recommendations questions were developed.

3.7.3 Field Observations

Field observation is a qualitative research method where researchers observe individuals or groups in their natural settings to gather descriptive data. It focuses on understanding behaviors, interactions, and contexts without manipulating the environment (Drew and Gergan, 2024). Direct observations were conducted while the researcher was issuing questionnaire and conducting interviews. The main advantage of using this technique is that it arguments the data collected through questionnaires. Participant field observation method is a non-participant as the researcher takes the role of the spectator (Chaudhari, 2022).

3.7.4 Focus Group Discussions

A focus group discussion refers to a research method that brings together small group of individuals chosen, due to predefined demographic traits to answer questions in a moderated setting (Nyumba, 2018). Focus group discussions were conducted in Gunyere Village. The focus group discussion consisted of 10 community members of the wetland management

committee. The discussion group took 60 minutes allowing individuals chances of sharing their needs and knowledge. The analyst communicated with participants using their local language (Shona) whilst jotting down answers in English. This is important because it gives participants room to freely express thoughts and experiences without language challenges.

3.8 Ethical Considerations

In research, ethical considerations refer to guiding principles that shape an individual conduct and design a study. This includes anonymity, confidentiality, voluntary participation and informed consent. They explore important roles in protecting rights of participants whilst bolstering integrity and credibility of a research study.

Informed Consent

Informed consent focuses on ensuring that participants voluntarily agree to participate in the research after being fully informed about their role. This is an important step where an individual validates his or her willingness to take part in the research, after understanding all key information that affect each person decision. For example, in this research, participants were made aware of the research objectives. Their informed consent was obtained by having them agree to the terms mentioned in the questionnaire.

Anonymity

Anonymity assures that identities of individuals participating in the study remain unknown to the researcher. This is important for safeguarding privacy of participants throughout data collection phase, presentation and analysis. In this study, respondent's identities were kept confidential by using numbers (optional) instead of names. This assisted them from being identified by outside parties.

Confidentiality

Confidentiality comes up when the researcher knows identities of the participants, making sure that the information is safeguarded from being discovered by others. In this study, the analyst implemented strict protocols to guarantee that all collected data was treated with high level of confidentiality and kept safe in a secure place. Moreover, the analyst used the data exclusively for the purposes that the respondents had agreed to.

3.9 Data Presentation

The data obtained was shown through graphs, charts and tables. These tools played important role in various sections of the study, making the data collected easy to read. They also assist in organizing information drawing conclusions effectively. Tables, charts and graphs eliminate repetitive of complex sentences summarizing key points.

3.10 Data Analysis

Qualitative data from observations, interviews and focus group discussions were analysed using Microsoft excel whilst quantitative data from surveys was examined using descriptive statistics. For statistical analysis, SPSS IBM v22 was used. Within SPSS, several tools were applied to achieve specific analytical goals. Descriptive statistics tools were used to summarize and describe the main features of the collected data, such as frequencies. Inferential statistics, including that is the chi-square tests were employed to test hypotheses and determine relationships or differences between groups. Integrating statistical analysis with thematic analysis create strong framework for understanding both numerical trends and contextual stories behind them (Flick, 2014.)

CHAPTER 4

RESULTS

4.1 Demographic Information

The majority of respondents in Gunyere Village are predominantly females. The age groups primarily range from middle-aged to older adults, with the largest proportion of participants falling within the 55 to 64 years age range. About 60.30% of the respondents in the households had ≤ 5 people and this means they are medium-sized families, and this also reduce pressure on resource utilization. Over half of the population have secondary education and nearly a quarter have tertiary education. The majority of individuals in Gunyere Village engage in agricultural activity (85.70%).

Table 4.1: Demographic Information of participants

Variable Gender	Category	Frequency	Percentage%
Age	≤ 8	6	9.50%
	18-24	3	4.70%
	25-34	6	9.50%
	35-44	6	9.50%
	45-54	9	14.20%
	55-64	24	38.10%
	≥ 65	9	14.20%
Gender	Male	24	38.10%
	Female	39	61.90%
Household size	1	0	0
	≤ 3	6	9.50%
	≤ 5	38	60.30%
	≤ 7	24	38.10%
	≥ 8	0	0
	No formal education	3	4.80%
Educational level	Primary	12	19.00%
	Secondary	33	52.40%
	Tertiary	15	23.80%
	Farmer	54	85.70%
Occupation	Fisher	0	0
	Artisan	0	0
	Trader	0	0
	Other	9	14.30%

4.2 Ecosystem services provided by Gunyere wetland

4.2.1 Ecosystem provisioning services

Figure 4.1 illustrates Gunyere wetland provisioning services used by the local community. The majority of population rely on the wetland primarily for food and water with 90.5% and 76.2%, followed by the use of raw materials and medicinal plants but to a lesser extent. This outlines the significant role of ecosystems in providing important resources for community's well-being

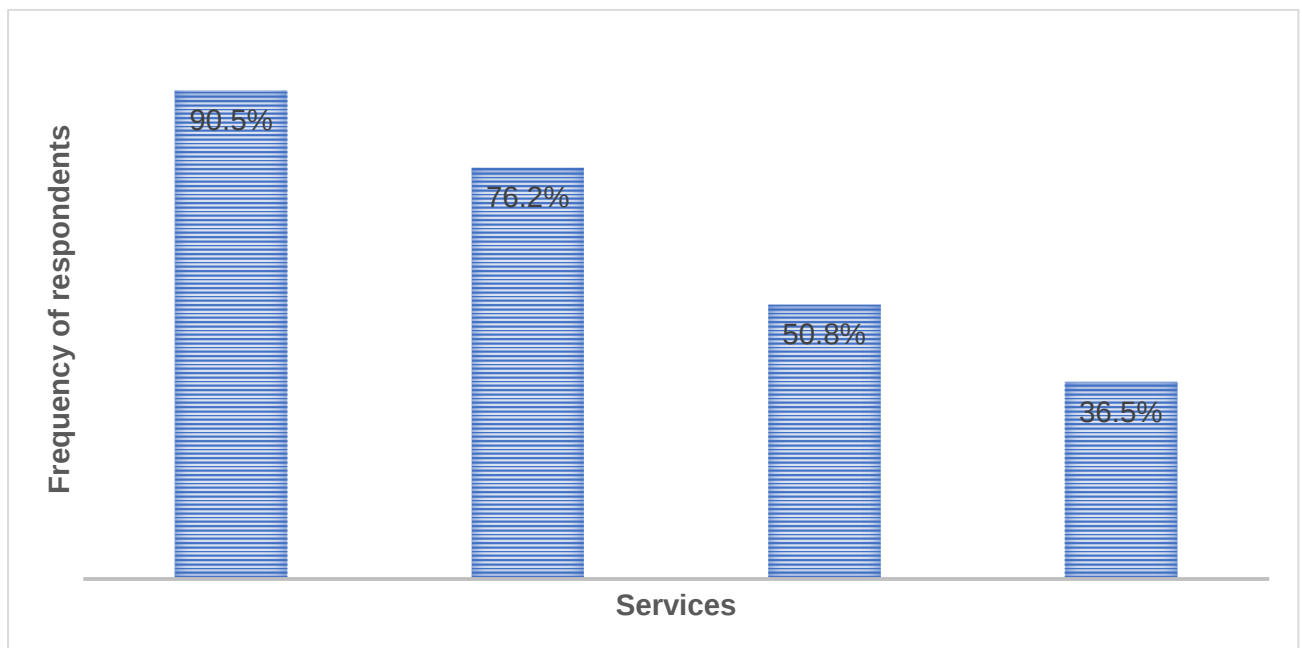


Figure 4.1: provisioning services offered by Gunyere wetland

4.2.2 Gunyere wetland regulating services

The figure 4.2 show percentages of respondents who identified various regulating services provided by the wetland. Regulating services are processes that ecosystems perform to maintain good environmental conditions that benefit people. The highest percentage of respondents recognize climate regulation as the key ecosystem service followed by respondents who identified ground water recharge as an important service. 32% of participants mentioned flood control. The lowest percentage 24% of respondents recognized water purification an important service to the community.

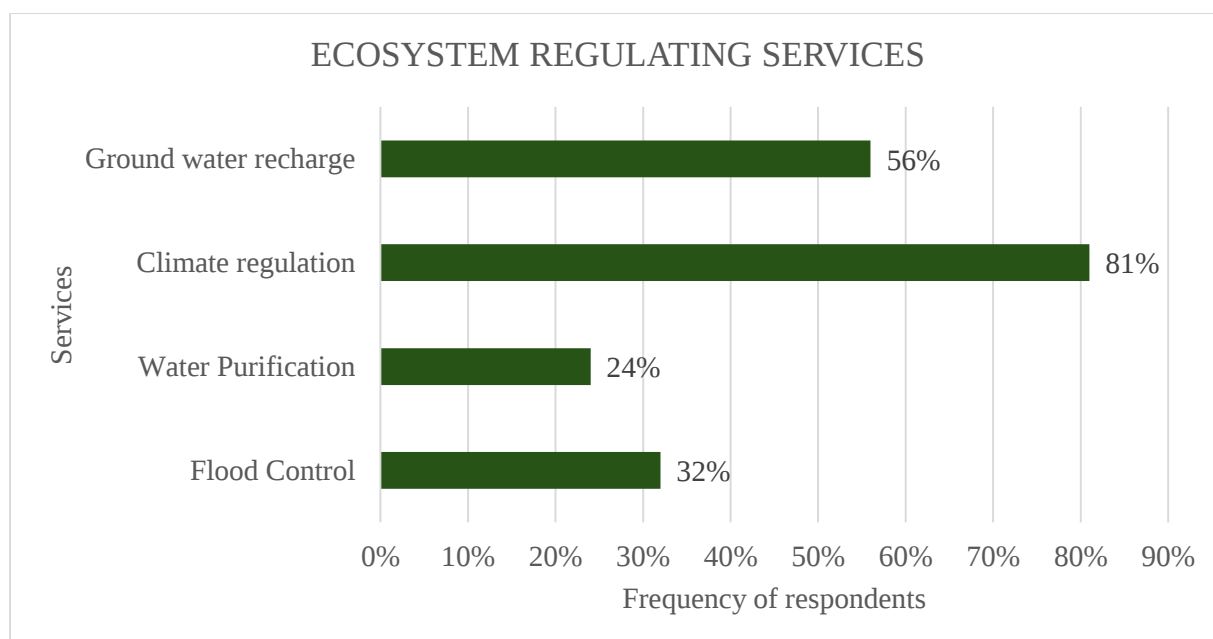


Figure 4.2: regulating services

4.2.3 Gunyere wetland supporting services

The table 4.2 demonstrate the wetland supporting services and their purpose to the environment and the local community. The wetland supports diverse range of plants and animal species and they have many benefits to the local community improving their livelihoods and in reducing poverty. 93% of respondents identified Waterberry (*Syzygium cordatum*) as a dominant plant species in the wetland, primarily valued for its fruit production and role in water availability. This shows its significant ecologically and economically to the local community. Type of fruit-bearing plants recognized are *Mangifera indica* (69%), *Annona senegalensis* (73%) and *Psidium guajava* (57%), this promotes local livelihoods and diets. On medicinal herbs, the majority highlighted *Lippia javanica* with 76% followed by *Erythrina abyssinica* 35%. *Vangueria infausta* and *Euphorbia tirucalli* were mentioned with very few respondents. Diverse animal species were recognized including, *Ptychadena mascareniensis* with 91% followed by *Varanus niloticus* with 80%.

Table 4.2: Plants and animals species identified in the wetland and their purpose.

	Species	Purpose	Frequency of respondents
Plant Species	Waterberry <i>Syzygium cordatum</i> (mukute)	water availability and fruits	93%
	Guava (<i>Psidium guajava</i>)	fruits	57%
	Mango (<i>Mangifera indica</i>)	fruits	69%
	Wild Medlar <i>Vangueria infausta</i> (mutunha)	herb	15%

	Red-hot-poker tree <i>Erythrina abyssinica</i> (mutiti)	herb	35%
	Muhwahwa	herb	11%
	Fever Tea <i>Lippia javanica</i> (Zumbani)	herb	76%
	Parafini Tree <i>Euphorbia tirucalli</i> (muparafini)	brushing teeth	1%
	Wild custard-apple <i>Annona senegalensis</i> (muroro)	fruits	73%
	Sugar Plum <i>Uapaca kirkiana</i> (mazhanje)	fruits	33%
	Black Plum <i>Syzygium cordatum</i> (tsubvu)	fruits	22%
	Black Nightshade <i>Solanum nigrum</i> (tsambati)	fruits	5%
	black jack <i>Bidens pilosa</i> (mutsine)	Food (act as vegetables)	45%
Animal Species	Snakes e.g., <i>Naja nivea</i> - Cape Cobra	rodent killer	77%
	Guinea Fowl <i>Numida meleagris</i> (hanga)	food	59%
	Various Grasshoppers e.g., <i>Caelifera suborder</i>	food	63%
	Various Frogs e.g., <i>Ptychadena mascareniensis</i>	water availability	91%
	Bush duiker <i>Sylvicapra grimmia</i> (mhembwe)	Seed dispersal and vegetation management	35%
	Rabbits <i>Lepus saxatilis</i> (Scrub Hare)	They barrow and provide shelter for other animals	50%
	Nile monitor lizard <i>Varanus niloticus</i> (mupurwa)	They consume carrion contributing to ecosystem cleanliness	80%
	Wathog <i>Phacochoerus africanus</i>	The help spread plant seeds through their consumption and digestion	47%
	Monkeys <i>Chlorocebus pygerythrus</i>	They serve as prey for predators	72%
	Birds	pollination	80%

4.3 Socio-economic benefits of Gunyere wetland to household income

4.3.1 Socio-Economic benefits

Figure 4.3 emphasize that farming is the dominant economic activity benefiting individuals in Gunyere Village contributing to household income. Non-timber forest products such as wild fruits, mushrooms and medicinal plants is the second mentioned benefit to the local community, with 23.8% of households benefiting from them. No households currently derive economic benefits from timber, fuel wood, livestock and grazing activities because they are

prohibited so as to sustainably manage the wetland and to reduce degradation and overexploitation of resources.

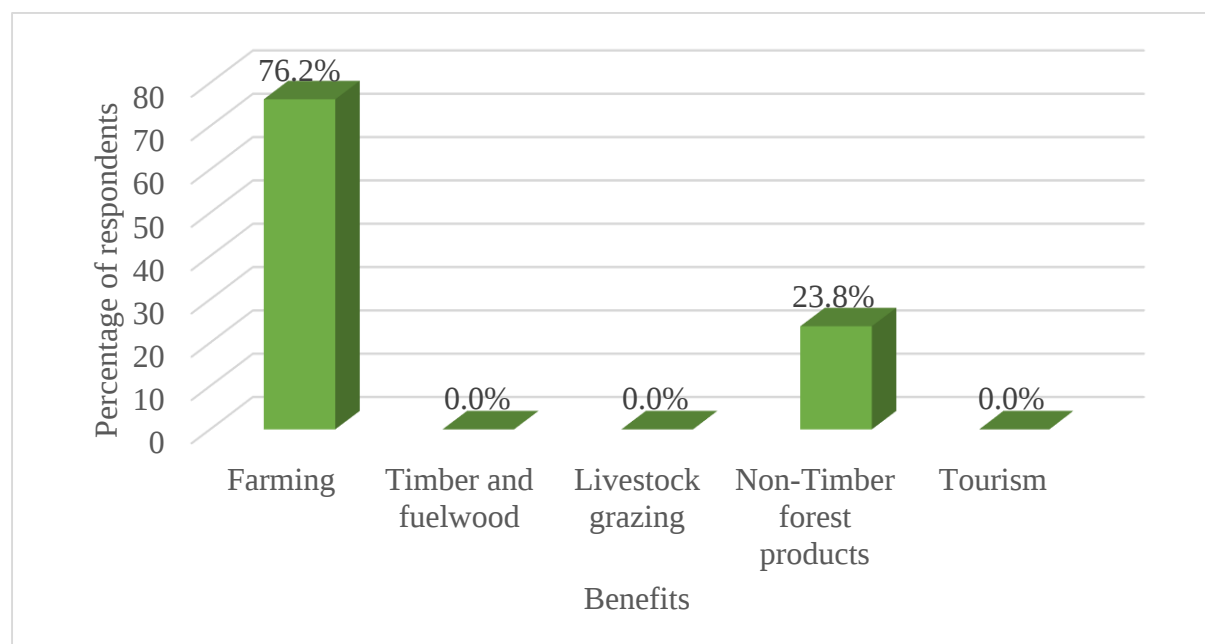


Figure 4.3: economic benefits of the wetland local households

4.3.2 Types of crops cultivated in the wetland

The results in table 4.3 highlight that maize, beans and sweet potatoes are commonly planted crops in the wetland. This essentially showed their role in food security and livelihoods. Legumes and vegetable crops contribute nutritionally and agriculturally to local households. The wetland support varied agricultural production sustaining local farming communities.

Table 4.3: Crops grown in the wetland

Crop Category	Crop Examples	Percentage of Farmers Growing %
Vegetable crops	Cornflower <i>Centaurea cyanus</i>	32%
	Onions <i>Allium cepa</i>	55%
	Cabbages <i>Brassica oleracea (capitata group)</i>	60%
	Cucumber <i>Cucumis sativus</i>	24%
	Carrots <i>Daucus carota</i>	15%
	Tomatoes <i>Solanum lycopersicum</i>	45%
Field crops	Maize <i>Zea mays</i>	91%
	Sugarcane <i>Saccharum officinarum</i>	19%
	Wheat <i>Triticum aestivum</i>	12%
	Sweet potatoes <i>Ipomoea batatas</i>	67%
Legumes	Groundnuts <i>Arachis hypogaea</i>	73%
	Beans <i>Phaseolus vulgaris</i>	86%

4.3.3 Monthly Income obtained from wetland related farming outputs

Figure 4.4 represents significant income difference among wetland farmers. The larger part of the households in Gunyere earn moderate monthly income of \$150 per month. A percentage of 35% earn below \$150. Only a small population of 13% earn above \$200 per month. This is typically influenced by differences in access to resources, poor access to market opportunities, environmental challenges and insufficient farming knowledge.

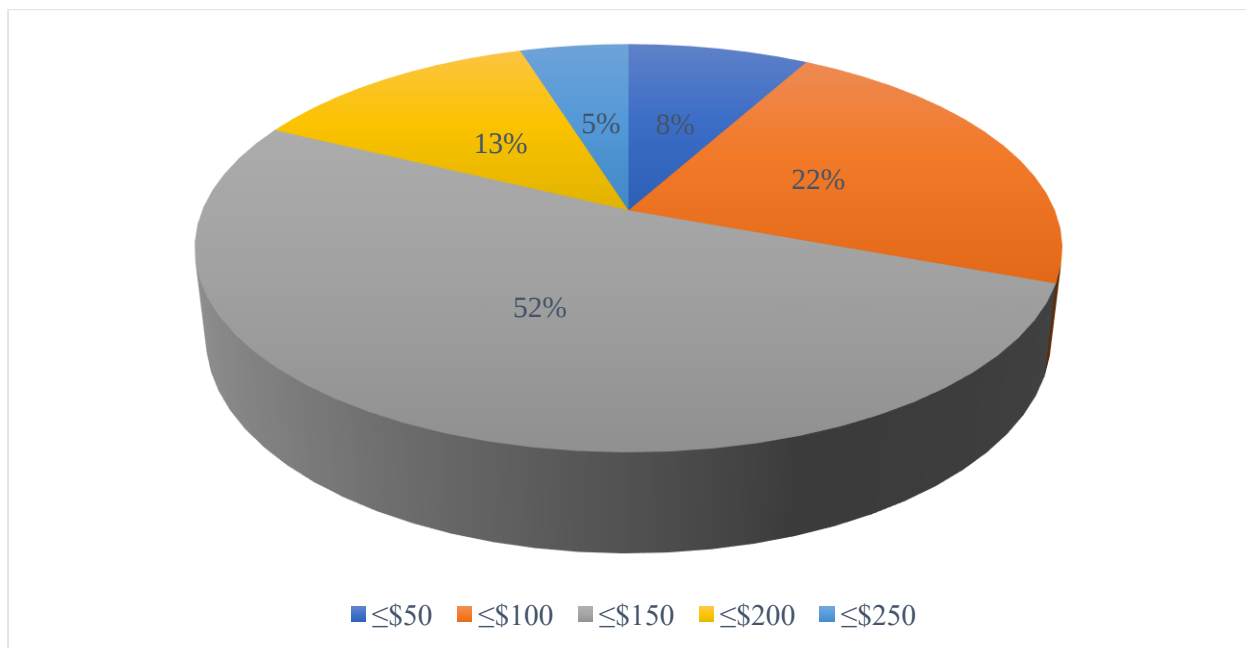


Figure 4.4 Monthly income from wetland related farming output

4.3.4 Hypothesis Test 1

The Chi-Square tests in table 4.4 reveal that there is a statistically significant association between man and women in the utilizing wetland resources, with a Pearson Chi-Square value of 17.279 ($p=0.001$). This means that gender significantly influence the utilization of resources provided by Gunyere wetland. The table shows a Pearson Chi-Square value of 17.279 with ($df=1$ and $p\text{-value}=0.001$). The Continuity Correction is 15.246 and Likelihood Ratio is 18.170 having the $p\text{-value}$ of less than 0,001. Fisher's Exact Test is used because the expected counts were very low. Fisher's Exact Test also gives a $p\text{-value}$ of 0.001, further validating the results. Therefore, we reject the null hypothesis that gender and wetland utilization are independent. Men and women utilize wetland resources differently. As a result, they differ in the types of resources they collect, the frequency of use and the purposes for which they use the wetland. These differences are influenced by factors such as social roles, cultural practices, economic activities and access rights related to gender.

Table 4.4 Chi-Square tests results

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	17.279 ^a	1	.000		
Continuity Correction ^b	15.246	1	.000		
Likelihood Ratio	18.170	1	.000		
Fisher's Exact Test				.000	.000
N of Valid Cases	63				

4.4 Challenges faced by the rural community in managing wetlands sustainably.

Figure 4.5 shows that climate change is the primary identified challenge with the highest percentage of 92.1%, indicating the need of strong awareness of its impact to the local community. High percentage of 90.5% and 87.3% for population pressure and lack of environmental education suggests that there is a perceived need for better public awareness and understanding of environmental issues to the local community. Insufficient government support is the less challenge compared to the others. These challenges contribute to wetland degradation, overexploitation of resources leading to the tragedy of the common.

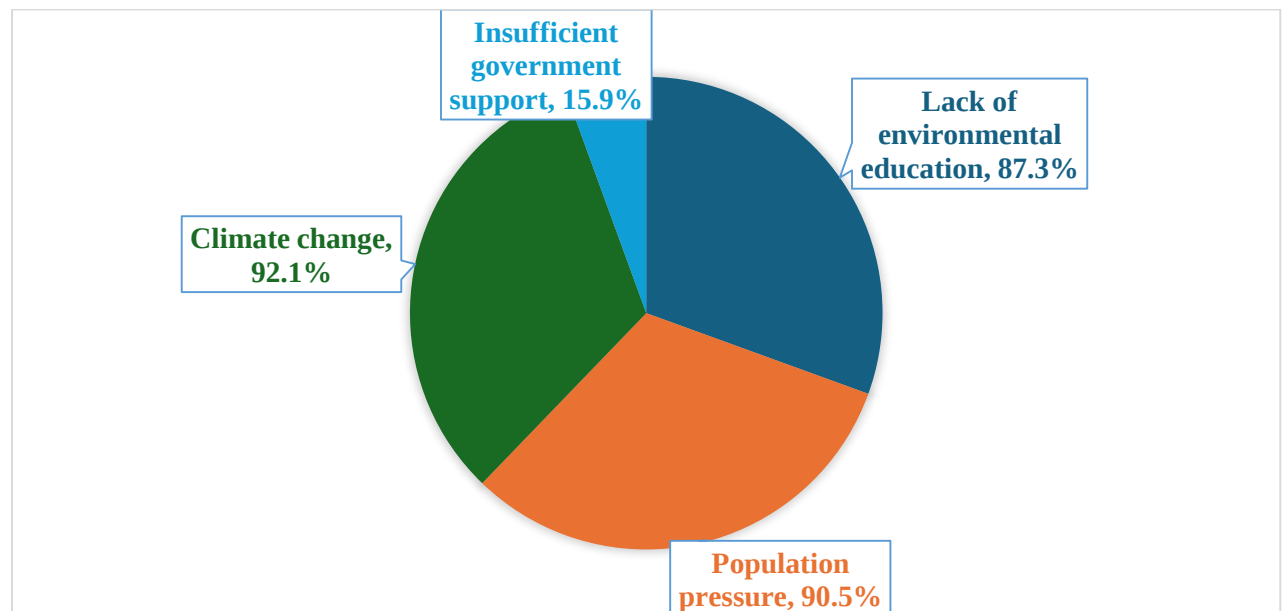


Figure 4.5: challenges faced by the local community

4.4.1 Hypothesis Test 2

A Chi-Square test was conducted to examine the relationship between type of challenge and the frequency which it is perceived as a barrier in Gunyere Village. Different types of

challenges are perceived as barriers with different frequencies. The results (Table 4.5) showed a statistically significant relationship, with a Pearson Chi-Square value of 127.400 (df = 3, $p = 0.000$) and a Likelihood Ratio Chi-Square value of 123.883 (df = 3, $p = 0.000$). Therefore, the null hypothesis was rejected, indicating that there is a significant association. As a result, some challenges are perceived as barriers more often than others. This suggests that not all challenges are equally impactful, some are more frequently recognized as obstacles than others.

Table 4.5: Chi-Square Tests results between the type of challenge and the frequency with which it is perceived a barrier

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	127.400 ^a	3	.000
Likelihood Ratio	123.883	3	.000
N of Valid Cases	252		

4.5 Suggestions to enhance sustainable wetland management and livelihoods

Table 4.6 indicate the percentage of respondents and stakeholders who identified each intervention as a priority. Market access and infrastructure enhancement are top recommendations, followed by alternative livelihood opportunities and provision of inputs.

Table 4.6: suggestions made for sustainable wetland management and livelihoods

Improvement	Percentage
Market access and development	89%
Provision of inputs	43%
Dam construction	77%
Drilling of boreholes	32%
Development of alternative income generating activities such as eco-tourism	71%

CHAPTER 5

DISCUSSION OF RESULTS

5.1 Ecosystem services provided by Gunyere wetland

The study revealed that a larger population of Gunyere village rely primarily on the wetland for food and water. Wetlands provide diverse food resources such as wild fruits, fish which are important for local nutrition and diets (Mandishona and Knight, 2022). Water from the wetland is primarily used for agriculture and domestic use. This support rural livelihoods as individuals typically engage in wetland farming improving their livelihoods (Kotze, 2016). Raw materials and medicinal plants are used by the community but to a lesser extent. The use of medicinal plants contributes to local health care. Some diseases are cured using medicinal plants like mutiti (*Erythrina abyssinica*), for example, if an individual experience strong stomach pain particularly running stomach, it is particularly used to cure the pain. Use of raw-materials promote economic activities like small-scale crafts. Reliance on these provisioning services contribute to ecosystem service trade-offs. There is a need for sustainable wetland management in Gunyere wetland to balance resource extraction with ecosystem health (Filyushkina et al., 2022). Similar studies revealed that in arid and semi-arid regions provisioning services support adaptation strategies against environmental variability and food insecurity (Boafo et al., 2016). Recognition of these services help to partake community-based conservation approaches and conservation priorities making sure that the wetland continues to provide important resources sustainably.

The findings also highlighted various regulating services provided by the wetland with high recognition of climate regulation as compared to other regulating services. This suggest that the community rely on the wetland as an important resource for maintaining water security and adapting to climate change challenges. Water regulation help to mitigate climate change impacts and support local climate stability by regulating temperature and humidity. Groundwater recharge identification show the wetland's potential of its hydrological function of replenishing underground aquifers, this is important for sustaining water particularly in arid and semi-arid regions. This function support agricultural activities, domestic use and ecological water needs. This outcome supports the Ramsar Convention guidelines that aim to maintain ecosystem services and ecological characters (Wood et al., 2013). Few respondents mentioned flood control, this reflects a gap in local understanding about this service. Similar studies in Africa show wetland's crucial role as natural buffers by absorbing and slowly releasing floodwaters, preventing downstream flooding contributing to community resilience (Barry,

2025). Water purification is the lastly recognized service with (24%), this indicates limited local awareness and visibility of this service (Mandishona and Knight, 2022). Water is important maintaining healthy ecosystems and providing safe water for human consumption.

The study also identified a variety of plant and animal species that are essential to the environment and local community. This shows that the wetland is a biodiversity hotspot for diverse plants and animal species. Plant and animal species promote ecological processes like pest regulation, pollination and nutrient cycling. This is also shown in other global findings that reflects wetlands as biodiversity hotspots supporting ecological networks important for ecosystem stability and resilience (Gopal, 2015). A variety of identified plant and animal species provide direct benefits to local community including, food (*Caelifera suborder*, *Numida meleagris*), herbs (*Lippia javanica*, *Erythrina abyssinica*) and brushing teeth (*Euphorbia tirucalli*). This directly support livelihoods, food security and traditional health practices in the local community reducing poverty. Species such as snakes and frogs serve as ecological indicators. They function as bio indicators by reflecting water quality and ecosystem balance which is important for the wetland health. They communicate and maintain conditions necessary for sustaining biodiversity and ecosystem functions. Conservation and sustainable management of Gunyere wetland is therefore important so as to preserve these species. This is also compatible with international frameworks (Ramsar Convention) that support wetland conservation to protect biodiversity and ecosystem functions. Therefore, it is crucial to undertake biodiversity monitoring and sustainable wetland use in order to safeguard and ensure longevity of ecological and socio-economic benefits (Zedler and Kercher, 2005).

5.2 Socio-economic benefits of Gunyere Wetland to local household income.

The study reflected high dependence of the local community on wetland agriculture as the primary source of income. This supports the multifaceted role of wetlands in promoting agricultural livelihoods, particularly in rural areas. Wetlands offer fertile soils and water resources that increase crop yields (van et al., 2025). The use of NTFPs such as mushrooms, medicinal plant and wild fruits supplement income from the wetland agricultural activities, providing diverse livelihood options outside of conventional agriculture. This is similar to findings from some African wetlands where the use of NTFPs contribute extensively to household income and nutritional diversity (Kugonza, 2023). Prohibition of activities like timber harvesting, fuel wood collection, livestock and grazing demonstrate a planned approach set to safeguard the wetland ecosystems services by preventing overexploitation ensuring continuity of provisioning services for future generation. However, controlled grazing can also

explore future income sources. This is also highlighted in wetland restoration policies worldwide, as they restrict extractive activities to sustain the ecological integrity and long-term sustainability of wetlands (Feng et al., 2024). Socio-economic benefits of Gunyere wetland promote livelihood adaptation strategies and income diversification. This is also comparable to a study conducted in China (Poyang Lake wetland), where wetland restoration led to continuous shifts in livelihood strategies.

The supremacy of maize as the most cultivated crop (91%) is due to the fact that it is the staple food in the country and other parts of Sub-Saharan Africa. The pattern of cropping in Gunyere wetland reflect that it is extensively used for crop production because of its fertile soils and water supply (Mharapara et al., 1998). High production of legume crops such as beans and groundnuts enhance soil nitrogen content, improving soil fertility, supporting conservation agriculture systems the wetland area. This contributes to food security in small holder farming systems. Vegetable crops are being planted by a significant portion of farmers and this show diversification resulting in improved nutrition and income generation. Low percentages of respondents pointed out wheat and sugarcane. This show that these crops are not planted often and they are limited to the wetland condition. In Zimbabwe, studies on vleis (seasonally waterlogged wetlands) reflect that a carefully management of wetlands allows for successful cultivation of maize, beans and vegetables during the wet season with wheat being planted in the dry season. However, the increase of wetland farming also leads to vegetation loss and wetland degradation if not managed well. In other wetlands particularly Zimbabwe, agriculture expansion caused ecological decline (Musasa and Marambanyika, 2020). Therefore, it is crucial to engage sustainable wetland practices e.g., the use of ridges to reduce waterlogging effects, crop rotation and to adjust planting dates to balance productivity with conservation.

This study has shown that the majority of households in Gunyere local community earn a steady monthly income of around \$150. This demonstrate that wetland farming offers a moderate livelihood source for many households. Similar studies in Zimbabwe reflect that wetland farming results essentially to household incomes but is continuously limited due to factors such as market access issues and limited resources (Mahlatini et al., 2020). 35% of household respondents earn less than \$100, due to factors such as low input use, smaller landholdings and use of less diversified cropping systems. Results from Nyororo wetland demonstrate that small landholdings and increase in population density limit crop productivity and amount of income obtained (Manyakaidze et al., 2025). A very few percentages of 13% earn above \$200, this represents farmers with equipped knowledge, irrigation systems, access to inputs and market

linkages. This obviously revealed the capacity of wetlands in generating income and the importance of resource access (Taruvunga, 2009). Income generation disparities from wetland farming is affected by environmental challenges such as soil erosion, climate variability and wetland degradation reducing crop production and incomes. This highlights the need to continue putting emphasis on sustainable water and land management practices, providing farmer training and extension services empowering farmers to utilize wetland resources sustainably. These results depict the potential functions of vleis in supporting rural livelihoods and food security as also evidenced from a study conducted in Mvomero District, Tanzania where wetlands products contributed 69% of household cash income and sustained food availability throughout the year (Mahenya, 2008).

The study identified statistically significant difference between men and women in utilizing wetland resources for income generation. Men and women use wetland resources differently. This is typically shaped by social roles and responsibilities e.g., women relying more on services like (water collection, medicinal plants and food collection) while man focus on income generating activities like agriculture. This is similar to studies conducted in Tanzania (Kilombero floodplains) where women take roles only in resource collection for household sustenance whilst men engage in income-generating activities. This also influence how challenges and benefits are distributed. Women's reliance on wetland resources for daily household needs leads to resource depletion and environmental degradation whilst men economic activities focus on immediate financial gains rather than sustainable practices. Therefore, integrating gender-disaggregated data and analysis in wetland studies and policy formulation is important in order to customize interventions and monitor changes effectively.

5.3. Identified constraints in the management of the Gunyere wetland

The study revealed climate change as the highly recognized challenge affecting the wetland. Climate change increase water scarcity and affect wetland-depend livelihoods (Musasa and Marambanyika, 2020). In Zimbabwe, wetlands are vulnerable to erratic rains, droughts and floods which affect their hydrology and ecosystem functions. Zimbabwe's National Wetland Policy and Environmental Management Act Chapter 20:27 provide regulations for climate change but the effective implementation typically depends on community and capacity building. High population increase in the wetland contribute to increased resource extraction leading to the tragedy of the commons. It also contributes to vegetation loss accelerating degradation. Rural and urban wetlands in Zimbabwe, were destroyed due to rapid urbanization and informal settlements (Harare's 30 threatened wetlands) intensifying environmental stress

(Villar, 2014.). Lack of conservation awareness reflect a gap in understanding and valuing of the wetland by the local community. Limited public knowledge limit conservation efforts and compliance resulting in unsustainable use and habitat loss. Insufficient government support also undermines the wetland protection.

The study revealed a statistically significant association between the type of the challenge experienced and how often it is perceived as a barrier. Some challenges are more recurrent and critical than others reducing sustainable wetland use and household's ability to benefit socio-economically from wetland resources. For example, shortage of technical knowledge and extension services limit farmer's capacity to implement conservation farming methods. This is similar to findings from Sub-Saharan where extension service gap destruct rural development and sustainable use of resources (Kotze, 2017). Climate change is the most critical frequently perceived barrier. It has disruptive effects on biodiversity, wetland hydrology and crop productivity affecting wetland-dependent communities. This directly link with world patterns where climate change causes resource depletion and livelihood risks. This varied perspective of barriers enables targeted interventions for capacity building, climate adaptation strategies and improved extension services to address most effective challenges, improving wetland management and socio-economic benefits. Similar studies reflect comparable statistical test in environmental and farming emphasizing the value of identifying which barriers most significantly affect resource users so as to design efficient interventions (Mandishona and Knight, 2022). Recognizing the extent to which barriers occur inform policy makers, forcing NGOs and government to allocate resources strategically focusing on knowledge dissemination and climate adaptation.

5.4. Suggestions to enhance sustainable wetland management and livelihoods in Gunyere Village.

The research revealed a strong attention on market access and development. Markets enable farmers and resource users to purchase wetland-related products at fair prices improving household income. A similar research in Africa reveal that a better market incorporation alleviate poverty and encourage sustainable use of resources by combining conservation and economic benefits e.g.,in Uganda, the Nakivubo urban wetland demonstrates high economic values, where conservation efforts help local communities sustain livelihoods (Schuijt, 2002). Suggestions for dam and borehole construction show the need to enhance water availability for farming and domestic use, also mitigating the impacts of climate change. About 71% of Gunyere village respondents emphasized on the development of eco-tourism. This diversifies

livelihoods and reduce pressure on wetland resources and promotes conservation awareness. Some respondents also suggested the need for education awareness on conservation practices. Similar studies from Save and Runde catchments highlight that combining scientific knowledge and indigenous knowledge systems enhance land and water management outcomes (EMA & FAO, 2020). 43% of respondents suggested access to inputs such as seeds, fertilizers to improve farming production and resilience. Multi-stakeholder wetland conservation efforts in Zimbabwe emphasize on the collaborative approaches that involve the NGO's, government, communities and also research institutions to implement suggested requirements.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The Gunyere wetland ecosystem services and community interactions assessment showed the contribution of the wetland to the livelihood of the local community, biodiversity and environmental resilience. Provisioning services such as food, water, and regulating services such as climate regulation and groundwater recharge and supporting services including diverse plants and animals all contribute to the socio-economic well-being of people. Therefore, the conducted chi-square test comparing men and women in utilizing these wetland resources revealed a significant association between men and women in using them and it highlighted gender disparities in Gunyere community.

This study provides comprehensive knowledge that demonstrate the indispensable functions of wetlands in improving livelihoods and alleviating poverty. However, environmental pressures, government inefficiencies and socio-economic limitations severely impair sustainable wetland management. These issues impact wetland ecosystems' long-term viability. A statistical analysis comparing the type of the issue and the frequency with which it is viewed as a barrier revealed that some difficulties are more likely to arise and be a hindrance to sustainable wetland management as compared to others. This constrains the community from accessing optimal benefits from wetland resource. The community recommendations for improved market access, infrastructure development, education and livelihood diversification necessitate integrated strategy towards sustainable use of wetlands.

6.2 Recommendations

- i. To improve market development and access in order to enable communities that live near wetlands to sell their goods effectively, raising household income and encouraging the sustainable use of resources
- ii. To lessen the strain and increase revenue creation by diversifying sources of income through eco-tourism, beekeeping, handicrafts and other non-extractive activities.
- iii. To encourage conservation and offer education and awareness campaigns that emphasize wetland ecology and climate change adaptation.
- iv. Integrate gender-inclusive wetland management techniques to improve men and women cooperative gain, fair access to resources and involvement in decision-making.

- v. To encourage collaborations between local communities, NGOs, government organizations and research institutions to significantly integrate efforts to improve livelihoods and sustainable use.
- vi. To encourage building of dams and boreholes with support of solar systems to boost agricultural outputs and alleviate seasonal water constraint.
- vii. Provision of inputs to adopt climate-smart and conservation agriculture techniques that boost crop yields while conserving wetland ecosystem.
- viii. Promote sustainable financing mechanisms such as green bonds, community conservation funds and payment for ecosystems services (PES) to enhance support for wetland conservation and livelihood programs.

REFERENCES

Aazami, M. and Shanazi, K., 2020. Tourism wetlands and rural sustainable livelihood: The case from Iran. *Journal of Outdoor Recreation and Tourism*, 30, p.100284.

Adhikari, B.S. and Babu, M.M., 2008. Floral diversity of Baanganga Wetland, Uttarakhand, India. *Check list*, 4(3), pp.279-290.

Ahmad, M., Ahmad, W.S., Ahmad, S.N., Jamal, S. and Saqib, M., 2024. Tracing the roots of wetland degradation in India: a systematic review of anthropogenic drivers, ecological consequences and conservation strategies. *GeoJournal*, 89(1), p.24.

Assessment, M.E., 2005. Ecosystems and human well-being: wetlands and water. World resources institute.

Aslam, A., Parthasarathy, P. and Ranjan, R.K., 2021. Ecological and societal importance of wetlands: a case study of North Bihar (India). *Wetlands conservation: current challenges and future strategies*, pp.55-86.

Baumann, P., 2002. Improving access to natural resources for the rural poor. FAO LSP Paper (FAO), Rome.

Barry, T., 2025. Conservation and Restoration of Icelandic Wetlands: An Evaluation of Progress Towards Implementation of the Ramsar Convention on Wetlands. *Wetlands*, 45(4), p.34.

Boafo, Y.A., Saito, O., Jasaw, G.S., Otsuki, K. and Takeuchi, K., 2016. Provisioning ecosystem services-sharing as a coping and adaptation strategy among rural communities in Ghana's semi-arid ecosystem. *Ecosystem Services*, 19, pp.92-102.

Chaudhari, B., Panda, B., Šavija, B. and Chandra Paul, S., 2022. Microbiologically induced concrete corrosion: a concise review of assessment methods, effects, and corrosion-resistant coating materials. *Materials*, 15(12), p.4279.

Chikodzi, D. and Mapfaka, L.Y., 2018. Spatio-temporal variations of wetlands in Masvingo district of Zimbabwe and influences of climate change and variability. *Climate Change*, 4(15), pp.235-247.

Davis, K.E., Swanson, B., Amudavi, D., Mekonnen, D.A., Flohrs, A., Riese, J., Lamb, C. and Zerfu, E., 2010. In-depth assessment of the public agricultural extension system of Ethiopia and recommendations for improvement.

DeLaune, R.D. and White, J.R., 2012. Will coastal wetlands continue to sequester carbon in response to an increase in global sea level: a case study of the rapidly subsiding Mississippi river deltaic plain. *Climatic Change*, 110, pp.297-314.

Drew, G. and Gergan, M.D., 2024. Imagining Himalayan Glacial Futures: Knowledge Rifts, Disciplinary Debates and Icy Vitalities at the Third Pole. *Social Anthropology/Anthropologie sociale*, 32(1), pp.80-95.

Environmental Management Agency (EMA) and Food and Agriculture Organization (FAO). (2020). A cross-sector approach supporting the mainstreaming of sustainable forest and land management to enhance ecosystem resilience for improved livelihoods in the Save and Runde Catchments of Zimbabwe

Emerton, L., 1998. Economic tools for valuing wetlands in Eastern Africa (pp. 13-20). IUCN-The World Conservation Union, Eastern Africa Regional Office.

Feng, J., Wen, Y., Zhang, H., Duan, W. and Hao, H., 2024. Wetland restoration, household income, and livelihood structure of farmers. *Frontiers in Sustainable Food Systems*, 8, p.1256115.

Filyushkina, A., Komossa, F., Metzger, M.J. and Verburg, P.H., 2022. Multifunctionality of a peri-urban landscape: exploring the diversity of residents' perceptions and preferences. *Ecosystems and People*, 18(1), pp.583-597.

Ghosh, S., Anju, P., Pattanayak, R. and Sahu, N.C., 2024. Fisheries and aquaculture in wetland ecosystems: A review of benefits, risks, and future prospects in India. *Journal of Coastal Research*, 40(3), pp.598-612.

Gopal, B. (Editor) 2015. Guidelines for Rapid Assessment of Biodiversity and Ecosystem Services of Wetlands, Version 1.0. Asia-Pacific Network for Global Change Research (APN-GCR), Kobe, Japan, and National Institute of Ecology, New Delhi. 134 pages

Gordon, B.A., Dorothy, O. and Lenhart, C.F., 2020. Nutrient retention in ecologically functional floodplains: a review. *Water*, 12(10), p.2762.

Joshi, D., 2018. An integrated assessment of livelihood opportunities of wetland dependent communities of Koshi Tappu Wildlife Reserve, Nepal. Nepal.

Jiang, T.T., Pan, J.F., Pu, X.M., Wang, B. and Pan, J.J., 2015. Current status of coastal wetlands in China: degradation, restoration, and future management. *Estuarine, Coastal and Shelf Science*, 164, pp.265-275.

Kotze, D.C., 2016. A method to assess wetland ecological condition based on land-cover type.

Kumwimba, M.N., Batool, A. and Li, X., 2021. How to enhance the purification performance of traditional floating treatment wetlands (FTWs) at low temperatures: strengthening strategies. *Science of The Total Environment*, 766, p.142608.

Kugonza, R., 2023. The impacts of farming activities on wetlands.

Lamsal, P., Pant, K.P., Kumar, L. and Atreya, K., 2015. Sustainable livelihoods through conservation of wetland resources: a case of economic benefits from Ghodaghodi Lake, western Nepal. *Ecology and Society*, 20(1).

Lizias, K. and Felix, C., 2013. Wetlands and Urban Growth in Bindura, Zimbabwe. *Greener Journal of Environment Management and Public Safety*, 2(6), pp.195-199.

Mahenya, O.J., 2008. The role of wetland products to household income and food security in Mvomero district, Tanzania (Doctoral dissertation, Sokoine University Of Agriculture)

Mahlatini, P., Hove, A., Maguma, L.F. and Chemura, A., 2020. Using direct use values for economic valuation of wetland ecosystem services: a case of Songore wetland, Zimbabwe. *GeoJournal*, 85(1), pp.41-51.

Maimba, T. and Thebe, V., 2023. Changing Livelihoods and New Opportunities: Experiences of Resettled Farmers in Two Farms in Shamva District, Mashonaland Central Province, Zimbabwe. *Journal of Land and Rural Studies*, 11(2), pp.131-149.

Mandishona, E. and Knight, J., 2022. Feedbacks and trade-offs in the use of wetland ecosystem services by local communities in rural Zimbabwe. *Sustainability*, 14(3), p.1789.

Mandishona, E. and Knight, J., 2022. Historical changes in wetland management legislation and practices in Zimbabwe, and their implications. *Wetlands Ecology and Management*, 30(6), pp.1197-1211.

Matamanda, A.R., Chirisa, I., Mukamuri, B.B., Kaduwo, P. and Mhlanga, M., 2018. Harare's Deteriorating Wetlands: Why Sound Policies and Legislations Are Not Enough. Case Studies in the Environment.

Matthews, G.V.T., 1993, March. The Ramsar Convention on Wetlands: its history and development. Gland: Ramsar Convention Bureau.

Metwane, B.C., 2023. Perspectives on Wetlands' Cultural Ecosystem Services and Indigenous Wetland Management Practices in the Limpopo Province, South Africa (Doctoral dissertation).

Mharapara, I.M., Munema, M.D. and Mkwanda, R., 1998. Zimbabwe country paper Experiences on wetland characterization, classification, management and utilization for agricultural development in Zimbabwe: a case for wetland research.

Mphande, F.A. and Mphande, F.A., 2016. Rural livelihood. Infectious diseases and rural livelihood in developing countries, pp.17-34.

Moomaw, W.R., Chmura, G.L., Davies, G.T., Finlayson, C.M., Middleton, B.A., Natali, S.M., Perry, J.E., Roulet, N. and Sutton-Grier, A.E., 2018. Wetlands in a changing climate: science, policy and management. *Wetlands*, 38(2), pp.183-205.

Moser, T.L., Nelson, N., Ahiablame, L., Bean, E.Z., Boles, C., Cook, S.L., Hall, S.G., McMaine, J. and Schlea, D., 2021. Constructed wetlands for water quality improvement: A synthesis on nutrient reduction from agricultural effluents. *Transactions of the ASABE*, 64(2), pp.625-639.

Mutsaka-Makuvaza, M.J., Matsena-Zingoni, Z., Tshuma, C., Ray, S., Zhou, X.N., Webster, B. and Midzi, N., 2018. Reinfection of urogenital schistosomiasis in pre-school children in a highly endemic district in Northern Zimbabwe: a 12 months compliance study. *Infectious Diseases of Poverty*, 7, pp.1-16.

Musasa, T. and Marambanyika, T., 2020. Threats to sustainable utilization of wetland resources in Zimbabwe: a review. *Wetlands Ecology and Management*, 28(4), pp.681-696.

Nayak, A. and Bhushan, B., 2022. Wetland ecosystems and their relevance to the environment: importance of wetlands. In *Handbook of research on monitoring and evaluating the ecological health of wetlands* (pp. 1-16). IGI Global Scientific Publishing.

Ndlovu, N. and Mafuradidze, C., 2024. Impact of layering, sequencing, and integration approaches in mitigating food and nutrition insecurity in Zimbabwe. *AcTion: Aceh Nutrition Journal*, 9(2), pp.328-338.

Nwankwoala, H.O., 2016. *Hydrology Current Research*.

Nyathi, D., Ndlovu, J., Phiri, K. and Muzvaba, N.E., 2022. Climate change and food insecurity: risks and responses in Bulilima District of Zimbabwe. In *Handbook of climate change across the food supply chain* (pp. 421-436). Cham: Springer International Publishing.

O. Nyumba, T., Wilson, K., Derrick, C.J. and Mukherjee, N., 2018. The use of focus group discussion methodology: Insights from two decades of application in conservation. *Methods in Ecology and evolution*, 9(1), pp.20-32.

Přívara, A. and Přívarová, M., 2019. Nexus between climate change, displacement and conflict: Afghanistan case. *Sustainability*, 11(20), p.5586.

Qiu, J., Zhang, Y. and Ma, J., 2024. Wetland habitats supporting waterbird diversity: Conservation perspective on biodiversity-ecosystem functioning relationship. *Journal of Environmental Management*, 357, p.120663.

Qu, Y., Zeng, X., Luo, C., Zhang, H. and Ni, H., 2023. Prediction of wetland biodiversity pattern under the current land-use mode and wetland sustainable management in Sanjiang Plain, China. *Ecological Indicators*, 147, p.109990.

Ranjan, R., 2021. Restoring natural wetlands through financial incentives based adoption of constructed wetlands on agricultural farms. *Journal of Cleaner Production*, 317, p.128346.

Rebelo, L.M., Finlayson, C.M., Strauch, A., Rosenqvist, A., Perennou, C., Tøttrup, C., Hilarides, L., Paganini, M., Wielaard, N., Siegert, F. and Ballhorn, U., 2018, October. The use of Earth Observation for wetland inventory, assessment and monitoring: An information source for Ramsar Convention on Wetlands. Secretariat of the Ramsar Convention on Wetlands.

Reddy, K.R., DeLaune, R.D. and Inglett, P.W., 2022. *Biogeochemistry of wetlands: science and applications*. CRC press.

Sadiki, M.M., Van Deventer, H. and Hansen, C.D., 2024. Assessing the extent to which African wetland inventories can report to the global targets on biodiversity, including Goal A of the Global Biodiversity Framework. *African Journal of Aquatic Science*, 49(3), pp.254-261.

Sanchirico, J.N., Cochran, K.A. and Emerson, P.M., 2002. Marine protected areas: economic and social implications.

Samiee-Zafarghandy, M., 2023. Addressing Human Dimensions within the criteria for conservation and sustainable use of Ramsar Wetlands (Master's thesis, University of Waterloo).

Schneider, B., Zilli, F., Facelli, F. and Campana, M., 2020. Factors driving seed bank diversity in wetlands of a large river floodplain. *Wetlands*, 40(6), pp.2275-2286.

Scholz, M., 2024. Sustainable Water Treatment and Management. CRC Press.

Sukulao, T., Kurevakwesu, W., Tshugulu, A.N., Matanga, A.A. and Muridzo, N.G., 2025. Perceived causes and consequences of food insecurity in rural Zimbabwe: Using a decolonised methodology. *Journal of Social Development in Africa*, 40(1), pp.27-61.

Schuijt, K., 2002. Land and water use of wetlands in Africa: Economic values of African wetlands.

Skagen, S.K., Melcher, C.P. and Haukos, D.A., 2008. Reducing sedimentation of depressional wetlands in agricultural landscapes. *Wetlands*, 28, pp.594-604.

Sharma, R., Vymazal, J. and Malaviya, P., 2021. Application of floating treatment wetlands for stormwater runoff: A critical review of the recent developments with emphasis on heavy metals and nutrient removal. *Science of the Total Environment*, 777, p.146044.

Takavarasha Jr, S., Hapanyengwi, G. and Kabanda, G., 2017. Using Livelihood Profiles for Assessing Context in ICT4D Research: A Case Study of Zimbabwe's Highveld Prime Communal. *The Electronic Journal of Information Systems in Developing Countries*, 79(1), pp.1-22.

Taruvinga, A., 2009. Economics of wetland cultivation in Zimbabwe: case study of Mashonaland East Province.

Tekaligne, B., 2003. Environmental impact assessment and the wise use of wetlands. *Wetlands of Ethiopia*, p.86.

Van Dam, A.A., Robertson, H., Prieler, R., Dubey, A. and Finlayson, C.M., 2025. Recognising diversity in wetlands and farming systems to support sustainable agriculture and conserve wetlands. *Marine and Freshwater Research*, 76(5), pp.NULL-NULL.

Vhiga, H.L., 2019. Assessment of sustainability of livelihoods of households in "Fast Track" resettlement areas of Shamva District in Zimbabwe (Doctoral dissertation).

Villar, C., 2014. Wetlands and agriculture: partners for growth. Manila Bulletin, p.12. (7)

Wang, Y.S. and Gu, J.D., 2021. Ecological responses, adaptation and mechanisms of mangrove wetland ecosystem to global climate change and anthropogenic activities. International Biodeterioration & Biodegradation, 162, p.105248.

Wood, A.P., Dixon, A. and McCartney, M.P. eds., 2013. Wetland management and sustainable livelihoods in Africa (pp. 258-270). London, UK: Routledge.

Zaiton, S., Huda-Farhana, M.M. and Hasan-Basri, B., 2019. Conservation of mangroves in Kuala Perlis, Malaysia — a case study of socio-economic attributes of fishermen driving valuation in sustaining livelihoods through forest management. Journal of Tropical Forest Science, 31(4), pp.433-442.

Zedler, J.B. and Kercher, S., 2005. Wetland resources: status, trends, ecosystem services, and restorability. Annu. Rev. Environ. Resour., 30(1), pp.39-74.

Zhu, X., Jiao, L., Wu, X., Du, D., Wu, J. and Zhang, P., 2023. Ecosystem health assessment and comparison of natural and constructed wetlands in the arid zone of northwest China. Ecological Indicators, 154, p.110576.

APPENDICES

Appendix 1: Questionnaire



Dear Participant

My name is Irene Marovahopo a student at Bindura University of Science Education studying a bachelor degree in natural resources management. I am conducting a research project titled “the contribution of wetlands in supporting rural livelihoods and poverty alleviation a case study of Gunyere wetland ward 10 Bindura District. Data required in this questionnaire will be specifically used to complete the research project to be submitted to Bindura University of Science Education. Your responses will be treated with the highest level of confidentiality. Kindly do not provide your name to guarantee anonymity and answer all questions by circling the number in the appropriate box honestly and return it promptly.

Thank you in advance for taking your time to assist in my educational endeavor.

Respondent Number (optional).....

SECTION A

DEMOGRAPHIC INFORMATION

A1. Age:

- ☐ Under 18 ☐ 18-24 ☐ 25-34 ☐ 35-44 ☐ 45-54
☐ 55-64 ☐ 65 and above

A2. Gender:

- ☐ Male ☐ Female

A3. Marital Status:

- ☐ Single ☐ Married ☐ Divorce ☐ Widowed

A4. Household Size, "how many people, including yourself, live in your household?"

- ☐ 1 ☐ 2-3 ☐ 4-5 ☐ 6-7 ☐ 8 or more

A5. Education Level:

What is the highest level of education you have completed?"

- ☐ No formal education ☐ Primary education ☐ Secondary education
☐ Tertiary

A6. Occupation:

"What is your primary occupation?"

- ☐ Farmer ☐ Fisher ☐ Trader ☐ Artisan
☐ other specify.....

SECTION B

ECOSYSTEM SERVICES PROVIDED BY GUNYERE WETLANDS

B1 What benefits do you and your community receive from gunyere wetland.?

- ☐ food ☐ water supply ☐ raw materials (timber, fuelwood) ☐ medicinal plants

B2 How would you rate the quality of resources provided by gunyere wetland (eg water, plants, fish)?

- ☐ poor ☐ fair ☐ good ☐ excellent

B3 How frequently do you or your household use resources from the wetland?

- ☐ daily ☐ weekly ☐ monthly ☐ rarely

B4 What specific plant or animal species from the wetland do you use, and what are their purpose?

PLANT SPECIES	PURPOSE	ANIMAL SPECIES	PURPOSE

B5 How does the wetland support environmental balance in your area (e.g., flood control, water purification

- ☐ flood control ☐ ground water recharge ☐ climate regulation (drought resilience) ☐ water purification

B6 Water from the wetland is used for? A domestic B Livestock C Irrigation D General uses E not fit

SECTION C

SOCIO-ECONOMIC BENEFITS OF THE WETLAND

C1 What economic activities related to the wetland do you or others in your community engage in?

☐farming ☐tourism ☐timber and fuel wood extraction ☐livestock grazing

☐other (please specify).....

C2 What crops are grown in the wetland? A vegetable crops (e.g., tomatoes, tsunga) B Field crops only (e.g., maize) C both vegetable crops and field crops D Nothing E Any crop you want

C3 Estimate the average monthly income your household earns from wetland-related activities (e.g., fishing, farming, harvesting):

☐ ≥\$50 ☐ ≥\$100 ☐ ≥\$150 ☐ ≥\$200 ☐ ≥\$250 ☐ ≥\$500

C4 Are there any community members who depend on the wetland for their primary source of livelihood?

☐yes ☐no

C5 In your opinion how important is the wetland to the local community?

☐not important ☐somewhat important ☐very important ☐extremely important

C6. Have you received any benefits (e.g., trainings, subsidies) related to the wetland management and use?

☐yes ☐no

C7 Are there any products from the wetland that are sold commercially?

☐yes ☐no

if yes specify

C8 Are there any employment opportunities in your area that rely on wetland? If yes please describe.

SECTION D

CHALLENGES RURAL COMMUNITIES FACE IN MANAGING WETLANDS

D1) Have you noticed any changes in the wetland's condition over the past 5 years?

☐ yes, it has improved ☐ yes, it has deteriorated ☐ no noticeable change

D2) If deteriorated, what do you think are the main causes? (select all that apply)

☐ agricultural expansion ☐ water pollution ☐ overfishing/overharvesting ☐ climate change ☐ overgrazing ☐ other (please specify): _____

D3) what limits your ability to use wetlands sustainably? (*select all*)

☐ limited knowledge of conservation practices ☐ population pressure ☐ climate variability
☐ insufficient government support

D4) Are there community rules for wetland use? (*yes/no*)

if yes, specify

SECTION E

STRATEGIES THAT CAN BE IMPLEMENTED TO IMPROVE SUSTAINABLE UTILIZATION OF WETLANDS

E1) What support do you need from local authorities? (*select all*)

☐ access to credit/grants ☐ conflict-resolution mechanisms ☐ conservation education programs

E2) Would you participate in wetland restoration if compensated? (*yes/no/unsure*)

E3) Statements below indicate opinions that can be made to enhance sustainable wetland management, indicate your level of agreement by ticking the appropriate block.

Keys: 1. Agree 2. Disagree

Statements	Agree	Disagree
Community-based conservation initiatives		
Educational programs focusing on wetland ecology		
Implementing sustainable agricultural techniques in the wetland		

Developing alternative income-generating activities, such as eco-tourism		
Strengthening policy frameworks and enforcement mechanisms		

E4) Additional suggestions for improving wetland livelihoods?.....

Appendix 2. Interview guide

INTERVIEW GUIDE

SECTION A

Ecosystem services that wetlands provide to directly support rural livelihoods.

- A1. Can you describe the various resources and benefits you obtain from the local wetlands?
- A2. How do wetlands contribute to your household's daily needs and economic activities?
- A3. In what ways do wetlands influence agricultural productivity in communities?
- A4. Have you noticed any changes in the availability of resources from wetlands over the years? If so, what are they?
- A5. How important are wetlands compared to other natural resources in supporting livelihoods?

SECTION B

How local communities utilize wetland resources for economic activities.

- B1. What specific economic activities do the community engage in that rely on wetland resources?
- B2. Can you provide examples of products or services derived from wetlands that are sold or traded?
- B3. How has the use of wetland resources for economic purposes evolved in recent years?
- B4. Are there any traditional practices associated with utilizing wetland resources for income generation?
- B5. What role do wetlands play in local employment and income generation?

SECTION C

The challenges rural communities face in managing wetlands sustainably.

- C1. What difficulties do you encounter in preserving and maintaining the health of local wetlands?
- C2. Are there conflicts within the community or with external entities regarding wetland use?
- C3. How does climate change or environmental degradation impact your ability to manage wetlands?
- C4. What support do you receive from government or non-governmental organizations in managing wetlands?

SECTION D

Strategies to improve the sustainable utilization of wetlands in supporting rural livelihoods.

- D1. What practices do you believe are effective in promoting the sustainable use of wetland resources?

D2. Can you suggest any community-led initiatives that could enhance wetland conservation?

D3. How can external organizations assist in improving sustainable wetland management in your community?

D4. What policies or regulations do you think are necessary to support sustainable wetland use?

D5. How important is environmental education in promoting the sustainable utilization of wetlands?

Appendix 3. Focus group discussion questions

1. How does Gunyere Wetland primarily contribute to the income and way of life of your household?
2. How does your family's food security, particularly during the dry season, change with access to the wetland?
3. What difficulties do you encounter when using Gunyere Wetland to support your livelihood?
4. How should wetland resources be maintained, in your opinion, to guarantee protection and ongoing support for local livelihoods?
5. How has your community's poverty decreased as a result of the wetland's use?
6. Are there any indigenous or traditional methods that preserve the wetland while allowing for the use of its resources?
7. In the last few years, have you noticed any changes (positive or negative) in the wetland and your means of subsistence?
8. What assistance or actions do you believe the government or non-governmental organizations should do to enhance wetland management and rural livelihoods?