International Review of Social Sciences Research
Volume 6 Issue 2 June 2026
DOI: https://doi.org/10.53378/irssr.353349

Evaluating watershed restoration techniques for climate resilience and livelihood security in Matobo District, Zimbabwe

[1]Ashton Mutovhe & [2]Nqobile Sikhosana

Abstract

This study assesses watershed restoration techniques in mitigating the impacts of climate change and safeguarding livelihoods in Ward 7, Matobo District, Zimbabwe. The study used qualitative research approaches to collect, analyse and interpret the findings. There were three primary instruments, unstructured interviews, focus group discussions and observation. Using case study design and purposive and snowball sampling techniques, the study had an in-depth exploration of 20 participants in real-life contexts. Key findings revealed that communities in Matobo District employ several watershed restoration techniques which include conservation farming, afforestation, contour farming and construction of erosion control physical structures such as silt traps, stone bunds, gabions and check dams. The findings also unearth the reality that the community members have knowledge about watershed management though they face a myriad of challenges in implementation and maintenance of these structures. Key among the challenges include lack of resources, lack of stakeholder collaboration and lack of technical capacity. The study therefore recommends training sessions focused on advanced watershed management techniques, sustainable agricultural practices, and climate adaptation strategies.

Keywords: *climate change, mitigation, livelihoods, integrated watershed management, ecosystem restoration*

Article History:

Received: *December 8, 2025* ***Revised***: *February 20, 2026*
Accepted: *March 16, 2026* ***Published online***: *May 5, 2026*

Suggested Citation:
Mutovhe, A. & Sikhosana, N. (2026). Evaluating watershed restoration techniques for climate resilience and livelihood security in Matobo District, Zimbabwe. *International Review of Social Sciences Research*, 6(2), 51-71. https://doi.org/10.53378/irssr.353349

About the authors:
[1]Corresponding author. PhD. Postdoctoral Research Fellow, Population and Health Research Unit, North-West University, Mafikeng, South Africa. Email: nsikhosana2012@gmail.com
[2]MSC Development Studies, Lupane State University, Lupane, Zimbabwe. Email: ashtonmutovhe@gmail.com

1. Introduction

Climate change has emerged as a worldwide problem impacting people, policymakers, and organizations focused on adaptation and mitigation, particularly in poor nations in the Global South. Many ecological systems, such as wetland areas, forests, rivers and streams, riverbanks, and agricultural land are increasingly threatened by deterioration or modification due to population growth and climate change (Shivanna, 2022; Wang et al., 2023). Given this daunting challenge, debates on climate change and environmental deterioration as a cause of insecurity to human livelihoods have emerged in the last few decades. The arguments advanced indicate that human activities are the primary drivers of environmental degradation and climate change (Ahmed et al., 2018). Land degradation is a major global problem, the effects of which are felt most strongly in developing countries, where large proportions of the population derive their livelihoods directly from the land, as most communities rely on subsistence farming (Tully et al., 2015).

Watershed restoration has emerged as a vital global strategy for combating the adverse effects of climate change. Verdonschot and Verdonschot (2023) highlight its potential to enhance ecosystem services and improve community resilience. Effective restoration practices not only improve water quality but also support biodiversity, which is essential for local livelihoods. In the Zimbabwean context, the impacts of climate change are increasingly evident, prompting research and the implementation of watershed restoration initiatives as key strategies for strengthening climate resilience and rural livelihood security. According to the World Bank Group (2024), Zimbabwe is highly vulnerable to severe weather events and the broader impacts of climate change. In fact, the country ranks 174th out of 182 nations on the Notre Dame Global Adaptation Index (ND-GAIN), which assesses vulnerability to and readiness for climate change (World Bank Group, 2024). Natural hazards, particularly drought, significantly affect individuals, households, and communities, as well as the broader economy, especially in contexts where rural populations depend on rain-fed agriculture.

Statutory instruments, such as the Water Act of 1998 in Zimbabwe, provide a framework for managing water resources through catchment councils; however, challenges persist. Despite existing policy frameworks and various initiatives, catchment area management for small dams has been largely neglected (Nyoni, 2013). Evidence suggests that communal areas in Zimbabwe face escalating threats from environmental change and soil degradation, which endanger agricultural productivity and rural livelihoods (Nyahunda &

Tirivangasi, 2021). The vulnerability of these areas, including Matobo District, is further exacerbated by unpredictable weather patterns, such as prolonged droughts and erratic rainfall, leading to food insecurity and economic instability. To address these pressing concerns, Parwada and Chipomho (2024) argue for the need to investigate effective techniques that mitigate the impacts of climate change while promoting sustainable land management practices. This argument is based on the assumption that community-based conservation efforts offer a viable approach to strengthening resilience among local populations and enhancing environmental stewardship. Nevertheless, the existing literature reveals a significant gap in context-specific solutions for communal regions, as many national programs emphasize broad objectives while overlooking local realities.

This study is based on the assumption that Matobo District has not been immune to the challenges. Accordingly, its primary objective is to evaluate watershed restoration techniques and their role in enhancing climate resilience and livelihood security across five dam catchments in Ward 7. This study is significant as it contributes to the existing body of knowledge on watershed management and climate change mitigation, offering valuable insights for researchers, policymakers, and local communities. It further argues that integrating local knowledge into watershed restoration provides a more comprehensive understanding of its role in climate change mitigation. Therefore, this paper seeks to answer the question: What are the effects of watershed restoration techniques on climate resilience and livelihood security in Matobo District, Zimbabwe?

2. Literature Review

2.1. Theoretical Underpinning

This study is analyzed using the theoretical lens of the Pressure and Release (PAR) Model, which elucidates the complex relationship between social structures and environmental hazards, particularly in the context of climate change and its effects on livelihoods. Developed by Wisner (2016), the PAR model serves as a foundational tool for understanding how vulnerability progresses through the identification of root causes, dynamic pressures, and unsafe conditions that contribute to communities' susceptibility to climate-related hazards (Michellier et al., 2020). The PAR model helps practitioners understand and respond to people's vulnerability to disasters. It delineates three fundamental components of vulnerability: root causes, dynamic pressures, and unsafe conditions. Vulnerability is complex

because it encompasses various characteristics of individuals and groups that expose them to harm and limit their ability to anticipate, cope with, and recover from disasters (Wisner, 2016).

The PAR framework further emphasizes that communities are not merely sources of vulnerability but also key actors in restoring ecological balance. Shamrova and Cummings (2017) posit that the framework facilitates an examination of how stakeholders interact, the power dynamics involved, and how these relationships influence watershed management practices. By analyzing these interactions, the study identifies opportunities for collaboration as well as potential barriers that may hinder effective resource management.

In addition, the Access to Resources (ATR) model is employed to examine effective watershed restoration strategies in Matobo District. This approach requires the identification of specific cases in which community choices are shaped by fluctuations in resource availability and exposure to environmental hazards (Nelson, 2013). Furthermore, the application of geographic information systems (GIS) enables the visualization of the spatial distribution of resources and community vulnerability, thereby providing insights into areas with varying levels of resilience or susceptibility to climate change impacts (Nelson, 2013). It is also important to consider how community engagement in decision-making processes can enhance the effectiveness of watershed restoration strategies. This underscores the role of local knowledge and practices in strengthening resource management and resilience (Shamrova & Cummings, 2017). A comprehensive examination of the socio-political context is equally important, as it influences resource access and community decision-making. This encompasses governance structures, policies, and external pressures that shape community responses to climate change and resource management (Nelson, 2013; Shamrova & Cummings, 2017).

A critical insight from these models underscores the need to understand how communities navigate their choices across time and space when confronted with environmental hazards, which is essential for designing effective watershed restoration strategies (Nelson, 2013; Shamrova & Cummings, 2017). Furthermore, analyzing the socio-political context can reveal underlying power dynamics and institutional barriers that may either hinder or facilitate access to resources, thereby significantly influencing the effectiveness of restoration initiatives (Shamrova & Cummings, 2017).

2.2. Contextualising Watershed Restoration in Zimbabwe

Extant and recent literature reiterate the importance of watershed management and its potential to enhance climate resilience and safeguard the livelihoods of vulnerable

communities across the globe. It is important to note that watershed restoration techniques have been widely recognized as critical strategies for addressing climate variability. Relevant studies (Singh et al., 2025; Pal et al., 2025; Satriyono et al., 2025) document that key watershed management approaches include soil and water conservation practices, integrated agricultural systems, and nature-based solutions. Evidence further indicates that Zimbabwe has experienced significant rainfall variability over the past three decades, resulting in prolonged dry spells and extreme weather conditions that threaten crop and livestock production, as well as water availability for domestic use (Mwadzingeni et al., 2022; Nyahunda & Tirivangasi, 2021; Phiri et al., 2021). Subsistence agriculture remains the backbone of rural economies in Zimbabwe; therefore, diversification and the adoption of climate-smart practices have become essential for safeguarding rural livelihoods.

Land tenure systems and their governance also play a critical role in watershed restoration within the Zimbabwean context. Existing literature (Musarandega et al., 2018; Chirisa et al., 202`) emphasizes that factors such as local government institutional capacity, secure land rights, community leadership, and meaningful community participation are crucial for the adoption of climate resilience strategies and watershed restoration initiatives. Despite the presence of policies and institutional frameworks, challenges such as limited funding, fragmented governance, and implementation bottlenecks continue to constrain the country's adaptation efforts (Kupika et al., 2019; Barron et al., 2021). A major concern within Zimbabwe's land tenure system is the prevalence of socio-economic inequalities, where informal power structures have led to unequal access to restoration benefits and selective uptake of interventions (Mhlanga et al., 2025). Importantly, the scale and sustainability of watershed restoration efforts depend largely on secure land rights and inclusive governance. In the absence of these conditions, the widespread adoption of watershed restoration initiatives by communities is likely to remain limited, thereby reducing their overall effectiveness in enhancing climate resilience and livelihood security.

Some of the most critical watershed restoration mechanisms prevalent in the Zimbabwean context include soil and water conservation practices, nature-based solutions, ecosystem-based adaptation approaches, and integrated agricultural innovations, among others. Soil and water conservation practices, such as check dams, contour bunds, and vegetative buffers, have been widely implemented across rural areas in Zimbabwe. Literature (Barakagira & Ndungo, 2023; Makate et al., 2016) indicates that these practices are important

because they reduce sediment loads. In rural areas where rainfall is erratic, such interventions can improve agricultural yields and reduce downstream siltation of irrigated land. In terms of livelihood security, soil and water conservation techniques have been recognized for minimizing erosion, maintaining soil fertility, and supporting more stable crop production. This aligns with empirical findings on diversification and resilience in watershed contexts (Barron et al., 2021; Quandt et al., 2017; Makate et al., 2016).

Nature-based solutions, such as rock detention structures, have also been adopted to complement soil and water conservation efforts. Gooden and Pritzlaff (2021) argue that these practices can enhance water infiltration, stabilize riverbanks, and promote groundwater recharge. However, the literature remains limited regarding the adoption of such practices in Zimbabwe, even though global experiences offer scalable lessons that could inform their wider implementation in rural areas. Integrating agricultural practices with ecological restoration and water management strategies is essential for strengthening the adaptive capacity of rural communities. In this context, various innovative approaches, such as agroforestry, fishery–aquaculture linkages, and climate-smart cropping systems, have the potential to reduce vulnerability to climate-related risks and shocks (Lund et al., 2021). These watershed restoration techniques are particularly relevant in drought-prone regions such as Masvingo, Mashonaland West, Matabeleland North, and Manicaland, where soil moisture remains a key constraint. In these regions, Pfumvudza/Intwasa practices have been promoted as soil and water conservation strategies to enhance resilience and improve food security (Mavesere & Dzawanda, 2022; Phiri et al., 2021; Mpala & Simatele, 2024).

The success of these watershed restoration initiatives largely depends on participatory governance, including community-driven planning and the involvement of traditional authorities. These factors are consistently identified in the literature as critical determinants of adoption and long-term sustainability in watershed interventions in Zimbabwe.

2.3. Study Context

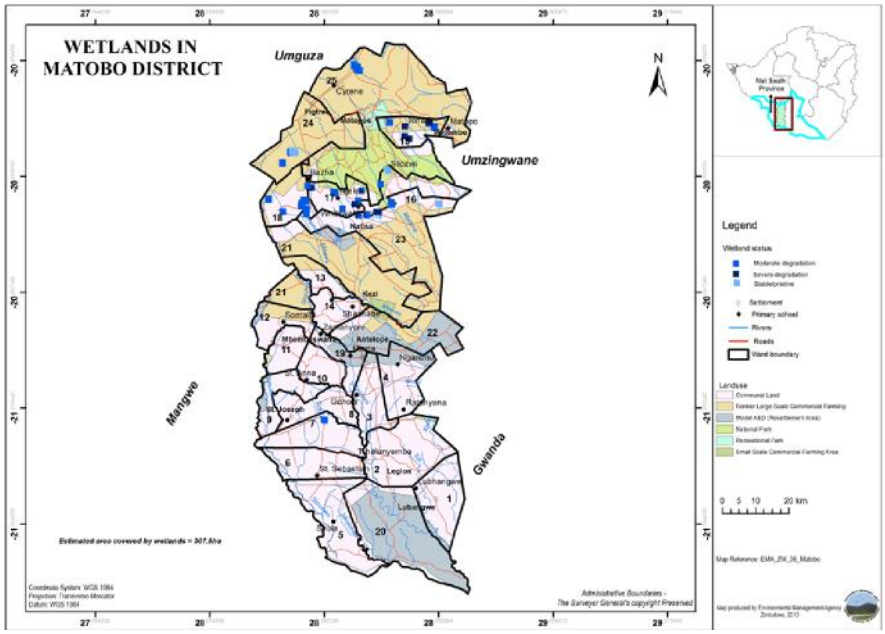
The study was conducted in Matobo District, specifically in Ward 7 (Malaba). The district predominantly falls within agro-ecological regions IV and V, which are characterized by low and highly variable annual rainfall ranging from 450 mm to 600 mm, often accompanied by prolonged dry periods. The average temperature is approximately 28°C. The region experiences a semi-arid climate, marked by intermittent seasonal droughts and

pronounced dry spells even during the rainy season, which typically occurs between November and March.

Several wards in the district contain wetlands that support community gardening during the dry season. However, the sustainability of these fragile ecosystems is increasingly threatened, as many wetlands are undergoing significant degradation due to unsustainable agricultural practices. Figure 1 illustrates a map of Matobo District and highlights the distribution of wetlands within the study area.

Figure 1

Map of Matobo District



Soil and water conservation structures were constructed to enhance water harvesting and retention, reduce soil erosion, and restore degraded ecosystems. The study focused on the watersheds of five dams, which are primarily used for small-scale irrigation, livestock watering, mining activities, and other livelihood-related purposes.

3. Materials and Methods

This study adopted a qualitative research approach, which focuses on understanding the subjective experiences and perspectives of stakeholders (Creswell & Creswell, 2018) involved in watershed restoration techniques, in order to gain an in-depth understanding of the

study phenomenon. A case study design was employed to enable a detailed exploration of specific instances within their real-life contexts. This approach allowed the researcher to identify unique patterns and factors influencing the success or challenges of different techniques, thereby providing a comprehensive understanding that broader quantitative methods might overlook.

Using purposive and snowball sampling techniques, the units of analysis consisted of 20 participants from each dam catchment, along with 25 in-depth interviews conducted with key informants. The study was carried out over a period of three months (June–August 2025) and utilized three primary data collection methods: unstructured interviews, focus group discussions, and observation.

The in-depth interviews were conducted face-to-face at the workplaces of the key informants after obtaining informed consent. Each interview lasted between 45 minutes and one hour. This approach enabled the researchers to probe for further clarification on the watershed restoration techniques adopted by communities in the district and how these have helped them recover from climate-related shocks. Open-ended interactions provided participants with the opportunity to express their views freely and allowed the researchers to capture a wide range of responses, both expected and unexpected. Voice recorders were used to collect data; however, some key informants were unwilling to be recorded, which made the process more time-consuming, as researchers had to manually document their responses. Additionally, a focus group discussion was conducted with community members to stimulate dialogue and validate information obtained from the in-depth interviews. The focus group comprised a heterogeneous mix of participants, including men, women, and youth involved in community-based watershed restoration efforts.

The data collected from interviews and focus group discussions were analyzed thematically, following a systematic approach to ensure a comprehensive understanding of community perceptions and practices regarding watershed management and its relationship with climate resilience and livelihood security. This study applied the framework developed by Braun and Clarke (2006). The process began with the familiarization phase, during which the researchers read and re-read the raw data to become fully immersed in it. The next step involved generating initial codes, where labels were assigned to significant features of the data. These codes were then organized into potential themes, which were subsequently reviewed

and refined in relation to the dataset. The final stage involved developing a detailed analysis of each emerging theme.

Ethical considerations were carefully observed throughout the research process. Approval was obtained from Lupane State University. In addition, permission was secured from relevant gatekeepers, including officials from Matobo municipal offices and traditional leaders within the communities. Informed consent was obtained from all participants, ensuring that they understood the purpose of the study and their right to withdraw at any time without penalty. Other ethical principles, including confidentiality, anonymity, and the avoidance of harm, were strictly upheld during the study.

4. Results

4.1. Awareness of Watershed Restoration Techniques

Participants' awareness of watershed restoration measures is critical, as it directly influences their adoption in practice. It also plays an important role in helping communities understand the factors that facilitate or hinder the uptake of these restorative practices. The findings revealed a clear variation in awareness levels among participants. A significant majority of respondents indicated that they were familiar with various restoration techniques used in their communities, such as conservation farming, streambank stabilization, and reforestation. For instance, many participants noted that conservation farming practices, such as crop rotation and reduced tillage, have been adopted to improve soil health and reduce erosion, although they are labor-intensive.

> *"Conservation farming is only feasible for able-bodied members of the community; as such, it is difficult for us, the widowed and elderly."* **(Participant 5, Ngoniwa Dam Catchment)**

This level of familiarity suggests that a foundational understanding of watershed management principles exists within the community, which is essential for effective engagement and participation in restoration efforts. Respondents also highlighted specific local initiatives, such as community-led reforestation projects, where villagers collaborate to plant indigenous tree species along riverbanks, thereby enhancing biodiversity and stabilizing the soil.

> *"Dabane Trust and Pro Africa Development have assisted us in setting up a nursery for indigenous tree species at Mfila Dam."* **(Participant 9, Mfila Dam Catchment)**

The relatively high level of awareness indicates that respondents recognize the importance of these techniques in addressing environmental challenges such as soil erosion, sedimentation, and water scarcity. Participants further noted that streambank stabilization efforts, using natural materials such as check dams, have contributed to reducing erosion and improving water quality in local rivers.

4.2. Adoption of Restoration Techniques for Climate Resilience and Livelihood Security

The adoption of watershed restoration techniques is crucial for rural communities, as it strengthens resilience to climate change and plays a vital role in safeguarding livelihoods. Equally important is the observation that when rural communities adopt watershed restoration measures, cumulative benefits accrue to biodiversity and water security, thereby creating a positive feedback loop that reinforces continued community engagement. The findings indicate that multiple techniques are actively being implemented within the community, with conservation farming and reforestation emerging as the most widely adopted practices. For example, many respondents reported using conservation farming methods such as cover cropping and minimum tillage, which improve soil structure and reduce erosion. This sustainable approach not only enhances crop yields but also improves soil moisture retention, thereby supporting local agricultural productivity.

> *"I have seen benefits in conservation farming and reforestation. The government, through the Department of Extension Services, provides us with small grain and legume seeds every year to plant in our fields. The seed handouts are followed by training and demonstrations on how to carry out agronomic practices. We are encouraged to practice intercropping and mixed cropping, as these practices help conserve moisture and improve soil fertility. In addition, we are encouraged to use live fencing, which is permanent and sustainable."* **(Participant 6, Malalatau Dam Catchment)**

Reforestation efforts were also widely reported, with several participants describing community-led initiatives in which villagers collaborate to plant trees in degraded areas. One

respondent from the Mfila Dam catchment highlighted a successful project involving the planting of indigenous tree species along riverbanks. This initiative not only provides shade but also stabilizes the soil and enhances habitats for local wildlife. Such proactive watershed management practices reflect a strong collective commitment to environmental restoration and conservation.

In addition, some respondents reported the use of structural measures such as stone bunds and silt traps to control soil erosion and manage surface runoff. For instance, stone bunds constructed along slopes in the Ngoniwa Dam catchment have proven effective in slowing water flow, allowing sediment to settle, and reducing land degradation. Similarly, silt traps have been installed in certain areas to capture sediment before it enters waterways, thereby improving water quality. Communities in the Ngoniwa and Mahlasela catchments were supported by a local non-governmental organization, Dabane Trust, in constructing gabions in highly degraded areas of the watershed to control erosion and promote vegetative regeneration.

Furthermore, the majority of respondents indicated that they had adopted some of the recommended techniques, demonstrating a personal commitment to environmental improvement and climate change adaptation. Participants also emphasized the benefits of conservation farming, particularly its contribution to increased crop yields and enhanced food security.

> *"We were trained in pegging dead-level contours using an 'A' frame by Pro Africa Development. I pegged two contours in my field, and they are serving a purpose. My grain yield has increased significantly; I used to harvest an average of 200 kg of grain, but after the intervention, my average yield has doubled to 400 kg."* **(Participant 7, Mfila Dam Catchment)**

4.3. Effectiveness of Watershed Restoration Techniques in Water and Food Security

In this study, the adoption of watershed restoration techniques is viewed as a means to an end, namely, livelihood security. Without making a meaningful contribution to water and food security in rural areas, restoration initiatives become less significant. In this regard, this subsection examines the extent to which the adoption of restoration practices has enabled communities to mitigate the effects of climate change and safeguard their livelihoods.

Preliminary analysis revealed that techniques such as reforestation and conservation farming received the highest ratings, indicating a strong consensus among participants regarding their effectiveness. For example, participants noted that reforestation not only

enhances local biodiversity but also contributes to carbon sequestration, which is essential for addressing climate change. Similarly, conservation farming practices, such as crop rotation and cover cropping, were commended for improving soil health, which increase resilience to extreme weather events, and boost overall crop yields. Conversely, methods such as silt traps and gabions received comparatively lower ratings. This suggests that, while these techniques are important, respondents may perceive them as less impactful in their specific contexts compared to more widely recognized approaches like reforestation. Participants explained that although silt traps are useful for capturing sediments, their effectiveness may be limited in areas with high water flow or frequent flooding, resulting in less favorable evaluations. Moreover, these techniques are labor- and resource-intensive, making them difficult for communities to implement independently without external support.

> *"The challenge we face as communal farmers is that we are resource-poor; as such, it is difficult for us to invest in resource-demanding initiatives such as silt traps and gabion construction without external support."* **(Participant 5, Ntshilahoko Dam Catchment)**

Furthermore, participants reported noticeable improvements in soil quality, including increased organic matter and enhanced nutrient availability, which have contributed to higher crop yields. One farmer indicated that the adoption of conservation farming practices had led to a significant increase in maize production, thereby improving household food security. In addition, respondents emphasized that terracing and wetland restoration are effective in capturing and retaining rainwater, reducing surface runoff, and ensuring a more reliable water supply during dry periods. This is particularly important in drought-prone areas, where consistent access to water can determine agricultural success or failure. For instance, a wetland located downstream of Mfila Dam was identified as a valuable resource for community members, who utilize it for market gardening. During drought periods, livestock such as donkeys and sheep are also observed grazing in the wetland area.

> *"We have a perennial water supply downstream of Mfila Dam, where seepage from the dam recharges a wetland below. Most community members use this water for market gardening. During drought years, animals such as donkeys and sheep graze on the wetland."* **(Participant 8, Mfila Dam Catchment)**

Such qualitative insights highlight the tangible benefits of watershed restoration efforts and underscore the importance of continued support and capacity-building in these practices. By sharing their experiences, community members not only validate the effectiveness of these techniques but also demonstrate their potential for scaling up to achieve greater environmental and economic resilience. This collective knowledge can serve as a powerful advocacy tool, encouraging stakeholders and policymakers to invest in and promote sustainable watershed management practices. Notably, communities in the Mfila and Ngoniwa dam catchments received training in dam maintenance and catchment management from a local NGO, Pro Africa, in collaboration with RIDA and EMA.

> *"We received training on dam maintenance and catchment conservation from the district team. They also advised us to utilize alluvial sediment deposits from the dam to fertilize our fields."* **(Participant 2, Ngoniwa Dam Catchment)**

4.4. Challenges in Implementing Watershed Restoration Techniques

The adoption and implementation of watershed restoration techniques in rural communities are not always smooth, as numerous and complex challenges hinder the process. Participants identified key constraints such as dependence on non-governmental organizations (NGOs), limited technical expertise, and inadequate resources. They noted that these barriers undermine the sustainability of restoration initiatives, particularly when projects rely heavily on external funding without adequately building local capacity.

> *"We mostly rely on donor support. For example, Dabane Trust is assisting us with gabion construction and tree nursery establishment, while Pro Africa Development supports reforestation and capacity building. Without this support, it would be difficult for us to sustain these activities due to limited resources and expertise."* **(Participant 11, Ngoniwa Dam Catchment)**

The majority of participants also indicated issues such as leadership conflicts and poor coordination among stakeholders, which complicate the implementation of effective watershed management strategies. They further indicated that divisions within the community, often influenced by political affiliations, can negatively affect collective participation in watershed restoration activities.

The analysis of the household interviews reveals a relatively high level of awareness and adoption of watershed restoration techniques within the community. While the perceived

effectiveness of these practices in mitigating climate change impacts is encouraging, significant challenges remain. Addressing these issues through enhanced training, improved resource allocation, and stronger stakeholder coordination will be essential for ensuring the sustainability and success of watershed restoration initiatives. The insights generated from this study provide a valuable foundation for designing targeted interventions aimed at empowering communities and strengthening their resilience to climate change.

4.5. Community Organization and Participation

The organization of community members for participation in watershed restoration activities is crucial to the success of these initiatives. This aspect is essential for local legitimacy, equity and inclusion of previously disadvantaged groups, and learning and adaptive management. The primary objective is to ensure that all interventions align with local needs, which enhances the adoption of watershed restoration techniques. Participants explained that local leaders often facilitate meetings to discuss upcoming projects, encouraging inclusive participation and the contribution of ideas and resources. As one community leader remarked:

> *"We hold regular meetings where everyone is invited. It's important that every voice is heard, especially when it comes to decisions that affect our land."*
> **(Participant 8, Ntshilakoko Dam Catchment)**

Additionally, participants highlighted the significant role played by women and youth in these activities, reflecting growing empowerment and inclusion in community development initiatives. This represents an important step toward achieving gender equality and social equity in rural communities. One participant noted that women are often responsible for managing gardens and farms, particularly as many men in the community are working abroad, making women's involvement essential. Participants further reported that this inclusive approach not only fosters a sense of ownership but also strengthens social cohesion within the community.

Participation is widely recognized as a prerequisite for successful watershed development; however, there is no universally shared understanding of its meaning or how it can be effectively operationalized. Meaningful participation, where communities collaborate, contribute to decision-making, and share costs, has been identified as critical to the success and sustainability of such initiatives (Kolavalli & Kerr, 2002).

5. Discussion

The findings of this study provide significant insights into the watershed restoration techniques employed by the community and their effectiveness in mitigating the impacts of climate change on local livelihoods. These findings not only support existing literature but also highlight unique, context-specific dimensions that diverge from previously documented research. One of the key findings is the wide range of watershed restoration techniques implemented in Matobo District, including reforestation, contour farming, and the construction of check dams. Participants emphasized the importance of these approaches in improving soil quality and enhancing water retention. This aligns with the findings of Weinstein et al. (2017), who highlight the effectiveness of nature-based solutions in watershed management. In the similar vein, studies by Singh et al. (2025), Mavesere and Dzawanda (2022), and Pal et al. (2025) indicate that such techniques contribute to improved soil moisture retention. Evidence also points that these restoration practices support crop yield stability among rural households that rely on subsistence farming (Mpala & Simatele, 2024), thereby enabling more reliable harvests. However, the study demonstrated that community members have adapted these techniques to suit their local context, showcasing a level of innovation and resourcefulness that is often underrepresented in broader academic discussions.

The study also found that the organization of community members for participation in restoration activities is a critical determinant of success. Local leaders play a central role in facilitating meetings and encouraging participation, reinforcing the assertion in the literature that community engagement is essential for effective watershed management (Lantin et al., 2019). Furthermore, Kupika et al. (2019) argue that community-led approaches are particularly important in watershed restoration, as they enhance legitimacy and promote the uptake of interventions. In this regard, community involvement contributes to advancing equity and representation by providing previously marginalized groups with a platform to voice their perspectives. Notably, the focus group discussions revealed significant involvement of women and youth in restoration activities, an aspect that is often underrepresented in academic literature. This finding underscores the importance of recognizing diverse community roles when evaluating participation in watershed restoration initiatives.

Participants also reported notable improvements in food and water security as a result of restoration efforts. This finding is consistent with existing literature, which demonstrates that effective watershed management enhances agricultural productivity and strengthens

resilience to climate change (Gao et al., 2009). Similarly, Williams et al. (2015) assert that restoration measures such as buffer zones and agroforestry contribute to improved water stability and provide co-benefits such as increased income through diversified livelihoods. However, this study adds depth to the literature by documenting specific local success stories, such as the revival of previously dry streams and increased crop yields, outcomes that have not been extensively captured in prior research. These narratives illustrate the direct and tangible benefits of watershed restoration for rural livelihoods and emphasize the importance of qualitative evidence in understanding the full impact of such interventions.

Despite the positive outcomes, the study also identified several challenges in the implementation of watershed restoration strategies. Resource constraints, political dynamics, and limited technical capacity were frequently cited by participants. While existing literature acknowledges similar challenges (Brown & Lant, 1999), the focus group discussions revealed additional local dynamics, such as leadership conflicts, that are less emphasized in prior studies. In this regard, Musvota and Mukonza (2022) argue that fragmented governance can result in overlapping mandates, misaligned incentives, and reduced efficiency in watershed restoration interventions. This divergence suggests that, although general challenges are widely recognized, the specific context of Matobo District, particularly Ward 7, introduces additional complexities that influence the success of restoration efforts.

In discussing potential improvements to watershed management strategies, participants emphasized the need for increased training opportunities and stronger collaboration among stakeholders. These recommendations are consistent with literature advocating enhanced community capacity-building and stakeholder engagement (Richter & Dow, 2017). However, participants also highlighted the importance of diversifying funding sources, an issue that is less frequently addressed in the reviewed literature. This observation points to a gap in scholarly discourse concerning the financial sustainability of watershed restoration initiatives. The findings from the focus group discussions in Matobo Ward 7 provide valuable insights that both confirm and extend existing literature on watershed restoration techniques. There is strong alignment with previous studies regarding the importance of community engagement and the effectiveness of various restoration methods. At the same time, the study reveals unique local challenges and success stories that warrant further investigation. By acknowledging these contextual nuances, the research underscores the importance of adopting localized approaches to watershed management that reflect the specific conditions and dynamics of individual

communities. Such an approach not only deepens understanding of watershed restoration but also informs the development of more effective and sustainable strategies for mitigating the impacts of climate change on rural livelihoods.

6. Conclusion

This study provides an in-depth exploration of watershed restoration techniques in Matobo District, specifically Ward 7, and their effectiveness in mitigating the impacts of climate change on local livelihoods. Findings from focus group discussions reveal that the community employs a diverse range of strategies, including reforestation, contour farming, and the construction of check dams. These techniques have not only improved soil quality and enhanced water retention but have also contributed significantly to strengthening food and water security within the community. The findings affirm key insights from existing literature regarding the critical role of community engagement in watershed management. Local leaders play a central role in mobilizing participation, while the active involvement of women and youth emerges as a particularly notable feature of these initiatives. This emphasis on inclusivity strengthens community-driven restoration efforts by incorporating diverse perspectives and contributions.

Furthermore, the study highlights tangible benefits arising from these interventions, as illustrated by participants' accounts of revived local streams and increased agricultural productivity. These examples demonstrate how effective watershed management can directly improve rural livelihoods. However, the study also identifies several challenges, including resource constraints, political dynamics, and limited technical capacity. These challenges underscore the complexity of implementing watershed restoration strategies and point to the need for context-specific, inclusive, and well-supported approaches to ensure long-term sustainability and impact.

Disclosure Statement

No potential conflict of interest was reported by the authors.

Funding

This work was not supported by any funding.

Ethics Committee Approval

Ethics committee approval was received for this study from the Development Studies Development Research Committee dated 01 June 2024. Participants were informed about the purpose of the study and were asked to sign informed consent forms.

AI Declaration

Quillbot and Grammarly software were used only for language editing purposes.

ORCID

Ashton Mutovhe - https://orcid.org/0009-0004-4342-9779

Nqobile Sikhosana - https://orcid.org/0000-0001-8106-8709

References

Ahmed, N., Khan, T. I., Aboh, A., & Khan, I. (2018). Climate change and environmental degradation: A serious threat to global security. *European Journal of Social Sciences Studies, 3*(1), 161–171. https://doi.org/10.5281/zenodo.1307227

Barakagira, A., & Ndungo, I. (2023). Watershed management and climate change adaptation mechanisms used by people living in dryland areas of Lokere catchment in Karamoja, Uganda. *Environmental & Socio-Economic Studies, 11*(1), 45–57. https://doi.org/10.2478/environ-2023-0004

Barron, J., Skyllerstedt, S., Giordano, M., & Adimassu, Z. (2021). Building climate resilience in rainfed landscapes needs more than goodwill. *Frontiers in Climate, 3*. https://doi.org/10.3389/fclim.2021.735880

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Chirisa, I., Gumbo, T., Gundu-Jakarasi, V. N., Zhakata, W., Karakadzai, T., Dipura, R., & Moyo, T. (2021). Interrogating climate adaptation financing in Zimbabwe: Proposed direction. *Sustainability, 13*(12), 6517. https://doi.org/10.3390/su13126517

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

Gao, Q., Li, Y., Wan, Y., Qin, X., Jiangcun, W., & Liu, Y. (2009). Dynamics of alpine grassland NPP and its response to climate change in Northern Tibet. *Climatic Change, 97*(3), 515–528. https://doi.org/10.1007/s10584-009-9617-z

Gooden, J., & Pritzlaff, R. (2021). Dryland watershed restoration with rock detention structures: A nature-based solution to mitigate drought, erosion, flooding, and atmospheric carbon. *Frontiers in Environmental Science, 9*. https://doi.org/10.3389/fenvs.2021.679189

Kolavalli, S., & Kerr, J. (2002). Scaling up participatory watershed development in India. *Development and Change, 33*(2), 213–235. https://doi.org/10.1111/1467-7660.00248

Kupika, O. L., Gandiwa, E., Nhamo, G., & Kativu, S. (2019). Local ecological knowledge on climate change and ecosystem-based adaptation strategies promote resilience in the Middle Zambezi Biosphere Reserve, Zimbabwe. *Scientifica*, 1–15. https://doi.org/10.1155/2019/3069254

Lantin, A., Larsen, L., Vyas, A., Barrett, M., Leisenring, M., Koryto, K., & Pechacek, L. (2019). *Approaches for determining and complying with TMDL requirements related to roadway stormwater runoff*. https://onlinepubs.trb.org/onlinepubs/webinars/191031.pdf

Lund, A. J., López-Carr, D., Sokolow, S. H., Rohr, J. R., & De Leo, G. A. (2021). Agricultural innovations to reduce the health impacts of dams. *Sustainability, 13*(4), 1869. https://doi.org/10.3390/su13041869

Makate, C., Wang, R., Makate, M., & Mango, N. (2016). Crop diversification and livelihoods of smallholder farmers in Zimbabwe: Adaptive management for environmental change. *SpringerPlus, 5*(1). https://doi.org/10.1186/s40064-016-2802-4

Mavesere, F., & Dzawanda, B. (2022). Effectiveness of Pfumvudza as a resilient strategy against drought impacts in rural communities of Zimbabwe. *GeoJournal, 88*(3), 3455–3470. https://doi.org/10.1007/s10708-022-10812-3

Mhlanga, P. F., Wesch, N. S., Moseri, M. E., Neumann, F. H., & Ngobese, N. Z. (2025). Greening African cities for sustainability: A systematic review of urban gardening's role in biodiversity and socio-economic resilience. *Plants, 14*(20), 3187. https://doi.org/10.3390/plants14203187

Michellier, C., Pigeon, P., Paillet, A., Trefon, T., Dewitte, O., & Kervyn, F. (2020). The challenging place of natural hazards in disaster risk reduction conceptual models: Insights from Central Africa and the European Alps. *International Journal of Disaster Risk Science, 11*, 316–332. https://doi.org/10.1007/s13753-020-00273-y

Mpala, T. A., & Simatele, M. D. (2024). Climate-smart agricultural practices among rural farmers in Masvingo district of Zimbabwe: Perspectives on mitigation strategies to drought and water scarcity for improved crop production. *Frontiers in Sustainable Food Systems, 7*. https://doi.org/10.3389/fsufs.2023.1298908

Musarandega, H., Chingombe, W., & Pillay, R. (2018). Harnessing local traditional authorities as a potential strategy to combat the vagaries of climate change in Zimbabwe. *Jàmbá: Journal of Disaster Risk Studies, 10*(1). https://doi.org/10.4102/jamba.v10i1.651

Musvota, C., & Mukonza, R. M. (2022). An analysis of correlations between institutional governance and economic development in Zimbabwe. *The African Journal of Governance and Development, 11*(2), 440–456. https://doi.org/10.36369/2616-9045/2022/v11i2a4

Mwadzingeni, L., Mugandani, R., & Mafongoya, P. (2022). Socio-demographic, institutional and governance factors influencing adaptive capacity of smallholder irrigators in

Zimbabwe. *PLOS ONE, 17*(8), e0273648. https://doi.org/10.1371/journal.pone.0273648

Nelson, R. (2013). Conceptual frameworks for PaR and related pedagogy: From "hard facts" to "liquid knowing." In R. Nelson (Ed.), *Practice as research in the arts* (pp. 48–70). Palgrave Macmillan. https://doi.org/10.1057/9781137282910_3

Nyahunda, L., & Tirivangasi, H. M. (2021). Harnessing social capital as a determinant for climate change adaptation in Mazungunye communal lands in Bikita, Zimbabwe. *Scientifica, 2021*, Article 8416410. https://doi.org/10.1155/2021/8416410

Nyoni, K. (2013). Catchment management and its effects on arable lands of Zimbabwe: A look beyond the fast track land reform program. *Journal of Environmental Protection, 4*(10), 1123–1128. https://doi.org/10.4236/jep.2013.410128

Pal, I., Banerjee, S., Sinsamphanh, O., Kumar, J., & Doydee, P. (2025). Evaluating the climate resilience of agricultural livelihoods through the impact of climate change on sediment loss and retention: A step towards ecosystem-based adaptation in Savannakhet Province, Lao People's Democratic Republic. *Sustainability, 17*(15), 7162. https://doi.org/10.3390/su17157162

Parwada, C., & Chipomho, J. (2024). Remediation strategies that can be adopted to reclaim degraded soils in the communal areas of Zimbabwe. In A. D. Nciizah, A. Roopnarain, B. Ndaba, & M. E. Malobane (Eds.), *The marginal soils of Africa* (pp. 155–170). Springer. https://doi.org/10.1007/978-3-031-55185-7_9

Phiri, K., Nhliziyo, M., Madzivire, S. I., Sithole, M., & Nyathi, D. (2021). Understanding climate-smart agriculture and the resilience of smallholder farmers in Umguza district, Zimbabwe. *Cogent Social Sciences, 7*(1). https://doi.org/10.1080/23311886.2021.1970425

Quandt, A., Neufeldt, H., & McCabe, J. T. (2017). The role of agroforestry in building livelihood resilience to floods and drought in semiarid Kenya. *Ecology and Society, 22*(3). https://doi.org/10.5751/es-09461-220310

Richter, U. H., & Dow, K. E. (2017). Stakeholder theory: A deliberative perspective. *Business Ethics: A European Review, 26*(4), 428–442. https://doi.org/10.1111/beer.12164

Satriyono, R. D. A. P., Setiawan, E., Chasanah, Y. N., & Astuti, S. P. (2025). Integrating sustainable farming practices in flood-prone Bengawan Solo delta areas. *IOP Conference Series: Earth and Environmental Science, 1543*(1), 012046. https://doi.org/10.1088/1755-1315/1543/1/012046

Shamrova, D. P., & Cummings, C. E. (2017). Participatory action research (PAR) with children and youth: An integrative review of methodology and PAR outcomes for participants, organizations, and communities. *Children and Youth Services Review, 81*, 400–412. https://doi.org/10.1016/j.childyouth.2017.08.022

Shivanna, K. R. (2022). Climate change and its impact on biodiversity and human welfare. *Proceedings of the Indian National Science Academy, 88*(2), 160–171. https://doi.org/10.1007/s43538-022-00073-6

Singh, G. P., Dinesh, D., Jinger, D., Kumar, R., Kakade, V. D., Kar, S. K., … Madhu, M. (2025). Enhancing climate resilience through resource conservation practices in watershed of Western India. *Frontiers in Sustainable Food Systems, 9*. https://doi.org/10.3389/fsufs.2025.1612949

The World Bank Group. (2024). *Zimbabwe: Country climate change and development report*. https://openknowledge.worldbank.org/entities/publication/062f05a1-9676-4a12-ae9c-d6b3d3ba5242

Tully, K., Sullivan, C., Weil, R., & Sanchez, P. (2015). The state of soil degradation in Sub-Saharan Africa: Baselines, trajectories, and solutions. *Sustainability, 7*(6), 6523–6552. https://doi.org/10.3390/su7066523

Verdonschot, P. F. M., & Verdonschot, R. C. M. (2023). The role of stream restoration in enhancing ecosystem services. *Hydrobiologia, 850*, 2537–2562. https://doi.org/10.1007/s10750-022-04918-5

Wang, F., Harindintwali, J.-D., & Wei, K. (2023). Climate change: Strategies for mitigation and adaptation. *The Innovation Geoscience, 1*(1), 100015. https://doi.org/10.59717/j.xinn-geo.2023.100015

Weinstein, N., Balmford, A., DeHaan, C. R., Gladwell, V., Bradbury, R. B., & Amano, T. (2017). Seeing community for the trees: The links among contact with natural environments, community cohesion, and crime. *BioScience, 65*(12), 1141–1153. https://doi.org/10.1093/biosci/biv151

Williams, J. E., Neville, H. M., Haak, A. L., Colyer, W. T., Wenger, S. J., & Bradshaw, S. (2015). Climate change adaptation and restoration of western trout streams: Opportunities and strategies. *Fisheries, 40*(7), 304–317. https://doi.org/10.1080/03632415.2015.1049692

Wisner, B. (2016). Vulnerability as concept, model, metric, and tool. *Oxford Research Encyclopedia of Natural Hazard Science*. https://doi.org/10.1093/acrefore/9780199389407.013.25