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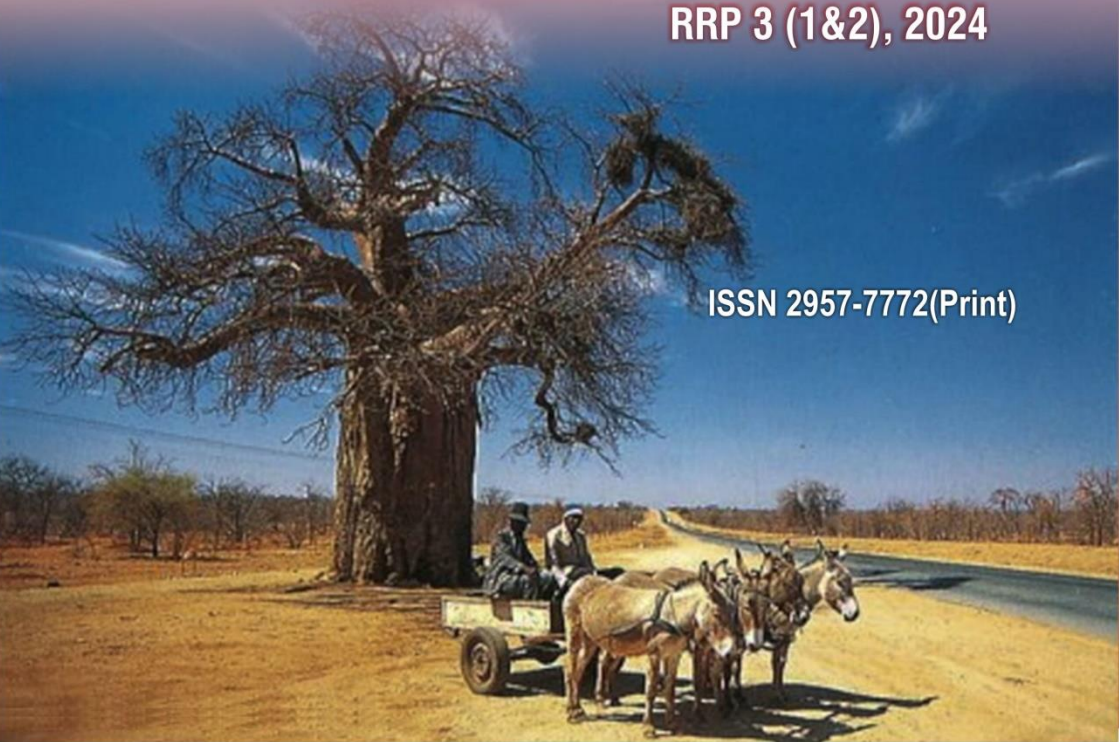

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About the Journal

JOURNAL PURPOSE

The purpose of the *Review of Rural Resilience Praxis is* to provide a forum for disaster risk mitigation, adaptation, and preparedness.

CONTRIBUTION AND READERSHIP

Sociologists, demographers, psychologists, development experts, planners, social workers, social engineers, economists, among others, whose focus is on rural resilience.

JOURNAL SPECIFICATIONS

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SCOPE AND FOCUS

In as much as the urban economic trajectory is increasing by each day, the rural economy, especially in many developing countries, still comprises a great proportion of the extractive and accommodation industries. Retaining some spaces as rural areas remains critical given the integral role rural areas play in providing ecosystem services to both wildlife and humanity. In this light, rural resilience as practice beckons for critical studies especially in the face of the ever-threatening extreme weather events and climate change that then impact on the livelihoods and lifestyles of the rural communities. Review of Rural Resilience Praxis (RRRP) comes in as a platform for critical engagement by scholars, practitioners, and leaders as they seek to debate and proffer solutions to the rural sectors' sustainable growth trajectory, which is resilient to the vagaries of climate change. This journal is also aimed at championing the philosophy of the right to be rural. The issue of conviviality between the different constituencies of the sectors, compiled with the competing challenges of improving rural spaces while also making the conservation, and preservation debates matter is the hallmark of this platform of critical thinking and reflection. The journal is published bi-annually.

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Articles must be original contributions, not previously published and should not be under consideration for publishing elsewhere.

Manuscript Submission: Articles submitted to the *Review of Rural Resilience Praxis* are reviewed using the double-blind peer review system. The author's name(s) must not be included in the main text or running heads and footers.

A total number of words: 5000-7000 words and set in 12-point font size width with 1.5 line spacing.
Language: British/UK English
Title: must capture the gist and scope of the article
Names of authors: beginning with the first name and ending with the surname
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Abstract: must be 200 words
Keywords: must be five or six containing words that are not in the title
Body: Where the authors are more than three use *et al.*
Italicise *et al.*, *ibid.*, words that are not English, not names of people or organisations, etc. When you use several authors confirming the same point, state the point and bracket them in one bracket and in ascending order of dates and alphabetically separated by semi-colon e.g. (Falkenmark, 1989, 1990; Reddy, 2002; Dagdeviren and Robertson, 2011; Jacobsen *et al.*, 2012).

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Indigenous Knowledge for Rural Resilience: Flood Control and the Green Infrastructure Agenda for Zimbabwe

FELIX MADYA[1], TINASHE MAGANDE[2], ROSELIN KATSANDE-NCUBE[3] AND BEATRICE HICKONICKO[4]

Abstract

Zimbabwe has committed itself to green infrastructure agenda to achieve resilience against recurrent challenges like flooding and sustainable growth. Nonetheless, there is still a significant gap in the application of indigenous knowledge to flood control techniques. This article contends that rural community resilience is put at risk when traditional wisdom is neglected since it reduces the efficacy of sustainable practices. This impedes the adoption of comprehensive and locally appropriate flood management measures by ignoring the priceless insights entrenched in indigenous knowledge. The main argument in this study is that, strengthening rural resilience within the Zimbabwe Green infrastructure framework requires a more thorough and culturally sensitive strategy that acknowledges and integrates indigenous knowledge systems. The study suggests that valuable indigenous knowledge, practices to support floods preparedness exist in rural Zimbabwe and they inform decision making in cushioning individual families from the impacts of floods. Cases of Muzarabani and Tsholotsho districts are used to reveal the critical role indigenous knowledge plays in promoting rural resilience. The study concludes that the country should promote the include the key component of indigenous knowledge initiatives to strengthen rural resilience. It recommends that rural communities have to deal with the dual challenge of the disappearance and preservation of indigenous knowledge system.

Keywords: *sustainability, flood management, floods preparedness, muzarabani, tsholotsho, preservation*

[1] College of Health Agriculture and Natural Sciences (CHANS), African University, Mutare, Zimbabwe
[2] Department of Urban and Regional Planning, University of Johannesburg, Johannesburg, South Africa.
[3] Faculty of Social and Gender Transformative Sciences, Women's University of Africa, Harare, Zimbabwe
[4] Department of Urban and Rural Development, Great Zimbabwe, University, Masvingo, Zimbabwe

INTRODUCTION

In Zimbabwe, the historical context of flooding unveils a recurring threat that has significantly impacted rural communities over the years. The Cyclone Eline induced floods of 2000 stand out as a pivotal moment, marking one of the worst flood-related disasters in the region. These floods not only resulted in a devastating loss of life but also triggered a cascade of challenges, including shortages of food and water, and the outbreak of malaria due to stagnant floodwaters (Gwimbi, 2007). The vulnerability of rural communities to such natural disasters has been exacerbated by their socio-economic status, as evidenced by the observations of Gumbo (2006) and Gwimbi (2009) that floods tend to hit the marginalised and impoverished the hardest. Furthermore, the more recent extreme weather event, Cyclone Idai in March 2019, showcased the persistent threat posed by flooding, causing extensive damage to homes, fields, schools, and roads in various districts, particularly in Chimanimani and Chipinge (UNDP, 2019).

A proactive response to the impending threat of climate change, Zimbabwe's green infrastructure goal is deeply entwined with its commitment to sustainable development. One major obstacle to sustainable development, according to the Intergovernmental Panel on Climate Change (IPCC), is climate change (IPCC, 2014). Sustainable development, as pointed by the UN (1987), is the cornerstone of Zimbabwe's approach to environmental concerns. Defined as development that meets present needs without compromising the ability of future generations to meet their own, sustainable development forms the cornerstone of Zimbabwe's approach to environmental challenges (WCED, UN, 1987). Addressing climate change and promoting a green economy are critical components of the global sustainable development agenda that is embodied in the Sustainable Development Goals (SDGs) (United Nations, UN 2016). An essential component of Zimbabwe's dedication to socioeconomic well-being is infrastructure that is acknowledged as the engine of sustainable growth (Beeferman & Wain, 2016; Pollais,2016). Greening buildings, encouraging walkability, and funding mass transit are important factors within the green infrastructure framework, as Matamanda *et al.* (2019) pointed out. These factors address both environmental concerns and socioeconomic development. Furthermore, the Environmental Protection Agency (EPA) highlights that Green Infrastructure (GI) contributes to community resilience both now and in the future by acting as a climate-resilient infrastructure (EPA, 2013). Examining how indigenous knowledge may enhance and supplement environmentally friendly approaches particularly in the context of flood management for rural resilience becomes imperative as Zimbabwe embraces the green infrastructure agenda.

Inadequate flood management methods have a profound effect on rural residents' livelihoods in addition to causing direct human deaths. Floods are a serious threat to housing, agriculture, and the general well-being of communities because of their abrupt and unpredictable nature (Ashwajit *et al*., 2015). The devastation caused by inadequate flood control is highlighted by the aftermath of Cyclones Eline and Idai that destroyed homes, fields, and essential infrastructure, upsetting the regular course of rural life (Gwimbi, 2007; UNDP, 2019). While flood hazards are natural, Action Aid International (2006) highlights that human activity is frequently linked to the damage and losses arising from these occurrences. This highlights the significance of effective flood control measures in limiting the impact on vulnerable communities. This necessitates a holistic approach to disaster resilience that not only addresses the immediate aftermath but also considers long-term sustainable solutions.

The neglect for indigenous knowledge (IK) in Zimbabwe's green infrastructure strategy highlights a critical gap, particularly as rural regions give way to urbanisation and contemporary scientific methodologies replace traditional flood prediction methods (Joshua et al., 2017). The gap with rural people, especially those with less formal education, is highlighted by criticisms of traditional weather and climate forecasting for its lack of localised knowledge and excessively technical language (Joshua et al., 2017). Seasonal rainfall projections are particularly difficult for scientists to make because of the increased variability in rainfall patterns throughout Africa (Finucane, 2009; Joshua et al., 2017). Indigenous knowledge is underreported in urban studies despite its demonstrated ability to work in tandem with scientific methods; this highlights the necessity of conducting assessments that are specific to the area (Kalanda-Joshua, 2011; Nkomwa *et al*., 2005). To close this knowledge gap, this study will assess the applicability of indigenous knowledge to weather and climate forecasting, particularly regarding rural flood preparedness. It will also investigate the efficacy of indigenous flood early warning systems and how they might strengthen community resilience.

LITERATURE REVIEW

This section presents literature review of the whole study. It is divided into four sections which are pillars building this study that is, Indigenous Knowledge Systems, Rural Resilience, Flood Control and the Green Infrastructure Agenda.

INDIGENOUS KNOWLEDGE SYSTEMS

Challenged by the traditional dependence on scientific knowledge alone, indigenous knowledge systems (IKS) have emerged as critical assets in solving climate crises (Finucane, 2009; Joshua *et al*., 2017; Mafongoya and Ajayi, 2017a, 2017b). Based on their extensive observations of plant indicators, animal behaviour, and astronomy, local communities have long relied on IK to help them make informed decisions about managing climate risks. This has been demonstrated by numerous studies (Kalanda-Joshua *et al*., 2011; Kangalawe *et al*., 2011; Kijazi *et al*., 2013; Nkomwa *et al*., 2013; Nyong *et al*., 2007; Roncoli *et al*., 2009). There are many examples, like in Swaziland where floods are predicted by the nest heights of emahloko birds, or in rural Malawi where communities evacuate to higher ground when a dark cloud appears in the west, indicating impending flooding (Mafongoya and Ajayi, 2017b; Kalinga-Chirwa *et al*., 2011; Nkomwa *et al*., 2013). In terms of forecasts, climate change, and seasonal predictions, the research points to a convergence between IK and conventional science (Joshua et al., 2017; Kalanda-Joshua *et al*., 2011; Mafongoya *et al*., 2017).

While there has been much research on the application of IK to weather or climate predictions, especially in Africa (Chanza and Mafongoya, 2017; Joshua *et al*., 2017; Mafongoya *et al*., 2017; Mubaya *et al*., 2017), some studies suggest that some IK indicators, especially those based on flora, may be losing value due to climate change, though this may vary depending on the context (Joshua *et al*., 2017). For systematic observations of the environment and the management of natural hazards, traditional groups in Africa, especially those in hazard-prone areas, have constantly relied on their IKS (Berkes, 2012; Kalanda-Joshua *et al*., 2011; Pareek and Trivedi, 2011). This generation-to-generation transmission of collective knowledge provides social capital for marginalised groups and is a priceless resource for scientific research (Mafongoya and Ajayi, 2017a). In light of Zimbabwe's green infrastructure strategy and flood control, it is critical to comprehend the dynamic interaction between traditional practices and changing climatic patterns as we investigate the potential of indigenous knowledge for rural resilience.

RURAL RESILIENCE

As communities struggle with the many issues that floods present, the idea of resilience especially in the context of rural flood resilience—has attracted a lot of attention. Resilience is a crucial component in surviving risks like flooding. It is described by the National Research Council (NRC) as "the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events" (NRC, 2012). Community resilience, as defined by Norris et

al. (2008), is the ability of a community to withstand and recover from such dangers. They emphasise the importance of social connections in enabling community members to mobilise for effective action (Breton, 2001; Murphy, 2007). Public health and sustainable development face significant obstacles as a result of the catastrophic effects of flooding that include morbidity, death, and injuries (Rentschler and Salhab, 2020). The impact of flooding must be addressed immediately, as 1.47 billion people, or 19% of the world's population, live in low- and middle-income nations and are at significant danger of flooding (Rentschler and Salhab, 2020).

The interaction between flood risk management and community resilience becomes critical in the African environment, where more than 50% of the population lives in rural areas and depends on floodplains and rivers for subsistence activities (Lumbroso, 2020). However, there is also disagreement over how to operationalize resilience, with different perspectives on whether it should be viewed as a process or an outcome (Patel et al., 2017; Rodina *et al.*, 2017). Resilience is defined by the Resilient Africa Network (RAN) as the ability of individuals and systems to reduce vulnerability and enhance well-being by mitigating, adapting to, recovering from, and learning from shocks and stresses (RAN, 2015). Bulti *et al*. (2019) gave a hazard-specific definition of community flood resilience, emphasising a community's ability to maintain or rapidly return to desired functions in the face of flood events and highlighting the importance of adaptation efforts, including pre-flooding preparedness and mitigation (Keating et al., 2014). As global policy discourses support a transformative and resilient approach in the water governance sector to mitigate the negative effects of climate change (Salinas Rodriguez et al., 2014), the relationship between livelihoods and flood risk management becomes a central concern for improving public health, community resilience, and sustainable development objectives.

FLOOD CONTROL

Flood control strategies have changed from being traditional and focused on maintaining the stability of physical infrastructure to being more inclusive and acknowledging the complex interactions between socio-ecological factors and complex adaptive systems (White and O'Hare, 2014). But the water industry has come under fire for taking so long to adopt novel and revolutionary approaches to bolster resilience—rather, it frequently accepts some degree of flooding as the norm (White *et al*., 2016). The Intergovernmental Panel on Climate Change (IPCC) states that changes in river management have a significant impact on regional floods. Extreme weather-related occurrences, such as heavy rain, typhoons, and tidal surges, increase the risk of flood

hazards (Cooney, 2012; Zhou *et al*., 2017). Different defence lines, such as seawalls, waterlog control systems, and urban drainage systems, are used by flood control systems that are divided into engineering and non-technical categories (Liu *et al*., 2014).

Sea level rise and ground subsidence pose threats to the integrity of seawalls, crucial engineering measures, in coastal rural regions, hence diminishing their ability to protect against flooding (Tang *et al.*, 2014). Mismatches in storm water storage and drainage capacities contribute to the risk of waterlogging. The regional waterlog control system that includes pumping stations, is intended to reduce the risk of waterlogging. On the other hand, the urban drainage system is essential for controlling floods. (Shi, 2012; Shanghai Municipal Drainage Authority, 2010). The Chinese government has extensively embraced flood hazard mapping as a means of obtaining precise information about flood disasters. Other non-engineering measures include flood control command systems, regulation systems, decision support systems, and flood hazard management (Liu *et al*., 2014; Chen *et al*., 2004). One important element that expands the capability of flood hazard mapping to include real-time warning and forecasting systems is the integration of real-time monitoring and risk analysis in high-risk residential zones (Zhong *et al*., 2014). The relationship between flood control measures and the indigenous knowledge of local people becomes crucial in creating comprehensive and context-specific flood resilience solutions in rural Zimbabwe when these mechanisms change to meet the dynamic challenges given by catastrophic weather occurrences.

GREEN INFRASTRUCTURE AGENDA

Green infrastructure integration has drawn a lot of interest worldwide as a sustainable way to lessen the effects of climate change in flood control techniques. Because of their ability to sequester carbon, forest ecosystems are thought to be essential for reducing the effects of climate change (Hamilton and Friess, 2018; Shahbazi and Nasab, 2016; Patil and Kumar, 2017). Street-side swales, bioshields, buffer zones, green roofing, porous pavements, mangroves, and wetlands are just a few examples of the solutions that make up green infrastructure that is an integrated approach to flood risk control that incorporates both structural and non-structural elements. To combat the effects of climate change and ensure sustainable urban drainage, the promotion of green infrastructure, including urban agriculture, has received strong support throughout Africa (Douglas, 2018). However, some people critique the idea, citing that it increases the problem of erosion and siltation when done in flood plains there by increasing the risk of floods.

The idea of urban green infrastructure that includes environmental conservation, urban agriculture, recreational uses, and woodland, has gained traction despite municipal plans that frequently favour the evacuation of settlements from floodplains and ignore urban agriculture (Benedict and McMahon, 2002). To make the most of the restricted space, urban green infrastructure is considered crucial during planning procedures, especially in places that are prone to flooding (Ahern, 2007; Hansen and Pauleit, 2014). Arguments supporting the importance of green infrastructure, including various forms of urban agriculture, to flood relief in Africa are substantial (Connors *et al*., 2016; Lwasa *et al*., 2014). This method is consistent with soft engineering techniques that emphasise surface runoff attenuation on slopes draining towards rivers and water retention over floodplains (Hannam and Hicks, 1980; Robinson and Speiker, 1978). The implementation of grassed streams and detention ponds during the 1970s in Australia and North America further highlights the global acceptance of green infrastructure as an effective technique for flood hazard reduction (Hannam, 1979).

METHODOLOGY

DATA SOURCES

This research uses multiple data sources and a multifaceted approach to obtain comprehensive insights. The foundation is desk research that entails a thorough assessment of the body of knowledge regarding indigenous knowledge, green infrastructure, and flood management in Zimbabwe and reports and scholarly publications. A comprehensive grasp of the existing state of knowledge will be provided by this desk study, making it possible to identify any gaps that call for more investigation. Finding current and pertinent conference papers, scholarly publications, and academic articles will be made easier with the use of Google Scholar and focused web searches. These resources support the study's theoretical framework and empirical underpinnings, guaranteeing a careful analysis of the various viewpoints that are now in use.

To learn more about national policies, programmes, and tactics pertaining to green infrastructure and flood management in Zimbabwe, government publications were closely examined. By including official perspectives, this inclusion guarantees agreement with governmental viewpoints and enhances the study. The literature review synthesises existing information, theories, and frameworks by combining insights from books and peer-reviewed journal articles. This thorough literature assessment helps discover patterns and gaps for focused investigation in addition to providing information for the study's

theoretical framework. In addition, case studies from various areas with comparable problems will be examined to create a framework for comparison that will give useful insights into effective strategies and lessons discovered.

To obtain a comprehensive picture of the interactions between indigenous knowledge and green infrastructure for flood management, a variety of data sources have been purposefully used. A broad theoretical framework is provided by desk research and literature reviews that also guarantee alignment with national policies. The study's academic rigour is enhanced by the inclusion of books, journal papers, and internet searches. Case studies offer a comparative lens and practical lessons from a variety of circumstances. Interviews with important stakeholders, such as members of the local community, specialists, and public servants, provide first-hand accounts and qualitative depth. This qualitative method enables a comprehensive investigation of cultural contexts and the applicability of traditional methods through the use of topic analysis and interviews. Triangulating these methods enhances the study's robustness, promoting a more comprehensive and reliable analysis of the integration of indigenous knowledge into Zimbabwe's green infrastructure agenda for flood control in rural areas.

FINDINGS

The research article provides important new information about the inherent usefulness of indigenous knowledge as a foundational understanding for rural communities in the flood-prone districts of in rural Zimbabwe. The people who live here have an extraordinary capacity to foresee floods by shrewdly reading environmental indicators like animal behaviour and cloud patterns. With the use of this indigenous knowledge, communities are better equipped to put a variety of coping mechanisms and adaptive measures into place. These include non-structural solutions like building temporary footbridges and structural solutions like higher platforms for shelters. The study highlights the resilience and adaptation inherent in indigenous knowledge, highlighting it as a vital resource for catastrophe planning and mitigation.

The study does, however, highlight difficulties in integrating indigenous knowledge into institutional frameworks for disaster management, despite the knowledge's obvious effectiveness. It is believed that government institutions undervalue traditional knowledge in favour of Western methods. The results suggest a more comprehensive approach that integrates traditional wisdom with contemporary techniques, acknowledging the mutual benefits between both. Furthermore, the effects of flooding on man-made structures, such as homes for people and vital infrastructure, highlight the necessity of

comprehensive resilience plans. Moreover, the research proposes the integration of ecosystem-based methodologies and green infrastructure to harmonise traditional customs with modern ways for all-encompassing and enduring flood risk mitigation. To sum up, the study promotes the acknowledgement, fusion, and balancing of indigenous knowledge within more comprehensive frameworks to strengthen rural communities against the challenges posed by floods in Zimbabwe.

CASE STUDIES

The following case studies shed light on the findings from well-known flood prone Districts in Zimbabwe. The two districts are found in region 5 in the Low veld.

CASE 1: MUZARABANI, ZIMBABWE

Indigenous knowledge systems are very important in influencing the coping mechanisms that the people in Muzarabani use to protect themselves against flooding. These tactics take into account both structural and non-structural methods, taking into account the socioeconomic conditions and the particular features of the floods that occur in the area (Paul & Routray, 2010). The series of precautionary measures includes building walls around homes, building using materials resistant to flooding, and elevating kitchen and storage areas to protect valuables from flooding. Conversely, mitigation measures include changing the frequency of meals, depending on inexpensive food sources like wild fruits, and looking for alternate sources of income. Each household adopts these tactics differently based on how vulnerable they are and how well equipped they are to withstand the shocks of flooding.

In Muzarabani, communities first prioritise preserving possessions and lives when implementing coping strategies. Common customs include raising homesteads, constructing elevated platforms known as dara, and fleeing to higher land. The construction of dara, utilised to keep kitchen utensils and other properties at a height above potential floodwaters, is firmly rooted in the community's flood resilience practices. One respondent narrated that

> "Normally, we build raised platforms outside our homes called *dara* to act as shelters. Alternatively, we look for safety on relatively higher land during floods."

Residents of Muzarabani also show a good awareness of flood-resistant materials; they choose traditional huts and structures that float during floods. Farmers also use natural coping mechanisms to safeguard crops. These include choosing crop varieties appropriate for the region, adhering to agro-ecological crop calendars, and planting in riverbank flood-prone areas with minimal tillage.

Floods make it difficult to store food and water that is why stockpiling is done in specialised houses called dura and polythene bags. On the other hand, communities move to higher ground with their necessary supplies when floodwater levels drastically rise. Food shortages during and after floods force people to adopt adaptable strategies, like cutting back on meal frequency and depending more on inexpensive foods like wild fruits. One of the participants explains:

> "Our capacity to store food and water is disrupted by floods, which is why we need to employ specialised constructions like dura and polythene bags. We take our critical goods and move to higher ground when floodwater levels significantly rise. We are forced to adapt by cutting back on the frequency of our meals and depending more on affordable options like wild fruits due to the difficulties of food scarcity during and after floods."

In addition, although it is hindered by the absence of conventional fuel resources during floods, households are forced to take preventive measures due to post-flood issues including infections transmitted by contaminated water. To deal with the difficulties caused by flooding, the community uses a variety of coping strategies, such as asset disposal and borrowing money (Del Ninno & Dorosh, 2003). Overall, the intricate interplay of indigenous knowledge and adaptive strategies underscores the community's resilience in the face of recurrent floods in Muzarabani.

CASE 2: TSHOLOTSHO DISTRICT, ZIMBABWE

Residents of Tsholotsho District, who live under continual threat of flooding, have shown a strong grasp of traditional knowledge that they have used to effectively address flood-related issues. To foresee rainy seasons with the potential for floods, locals have developed a thorough understanding of domestic forecasting techniques, drawing on indigenous wisdom. This involves keeping an eye on cloud patterns, documenting changes in native trees and researching the behaviour of particular animals, such the inkanku bird that is linked to rain forecasting. A participant narrated that

> "When we hear an inkanku crying nonstop during the rainy season, we know that heavy rains and possibly flooding are on the way. Then, in case it starts to rain, we get ready to go to higher ground."

The community's cultural norms and values are reflected in the incorporation of indigenous knowledge into flood prediction, underscoring the inherent relevance of these cultural elements (Domfeh, 2007).

Although indigenous knowledge plays a significant role in flood resilience, the community feels that disaster management authorities have significantly underestimated their insights, especially when compared to Western

knowledge. It is widely believed that the integration of traditional knowledge with modern methodologies has the potential to improve the overall efficacy of flood catastrophe management. One of the participants in Tsholotsho had to say:

> "We would be more effective in disaster response and recovery if we disaster risk reduction practitioners could appropriately integrate communities' indigenous knowledge with our understanding."

Floods in Tsholotsho District have a profound effect on the built environment in addition to human experience. Roads, bridges and dams were all severely damaged, as were human shelters, the majority of which were made of poles and mud. The significant losses incurred by these structures that were essential physical capital for the affected populations, highlight the complex effects of floods on livelihoods (Dube and Chiwanga, 2014).

Tsholotsho District is prone to recurring flooding due to its location in Zimbabwe's ecological region 5 that is distinguished by low rainfall levels. Despite this susceptibility, the affected communities' rich indigenous knowledge is frequently overlooked in the government's response and intervention that is frequently informed by contemporary methods. Equipped with a wealth of indigenous wisdom, the community not only predicts flooding but also makes well-informed decisions in the lead-up to, during, and following floods. This understanding includes estimating the amount of rain that will fall and utilising post-disaster strategies, such as land zoning and utilising locally accessible resources, to lessen the effects of flooding. Community participation is also prioritised in Tsholotsho, as one of the participants narrates that,

> "Improved community engagement would result from practitioners giving careful consideration to the indigenous knowledge of the local communities. Communities would readily take ownership of development initiatives through their participation, increasing the projects' significance and sustainability for the local community."

The indigenous knowledge of the society is firmly anchored in its ability for interpreting signals found in the natural world, such as cloud patterns and animal behaviours like those of the inkanku bird. With this knowledge, the community can take preventative action, such moving animal shelters to higher ground and building makeshift footbridges (amazibuko) over flooded rivers. During floods, these methods have been successful in guaranteeing the lives of cattle and the safety of villagers. As evidenced by Tsholotsho, indigenous knowledge is an invaluable tool for practitioners of disaster risk reduction, providing insights into the planning, forecasting, and execution of successful preventative and mitigation strategies that are specific to the local environment.

DISCUSSION

The study shed light on the critical role that indigenous knowledge plays in promoting rural Zimbabwe's resilience to flooding. Local populations in the districts of Muzarabani and Tsholotsho have proven to be very adept at using traditional knowledge to predict floods by utilising subtle observations of the natural world, like animal behaviour and cloud patterns. This indigenous knowledge serves as an early warning system, enabling communities to implement preventive and mitigative measures. These adaptable techniques that range from building temporary footbridges to elevating shelters on raised platforms, highlight the adaptability of indigenous knowledge in tackling the complex problems presented by floods.

The study shows that there is a disconnect between institutional disaster management organisations and traditional practices, even if indigenous knowledge is clearly effective. The undervaluation and marginalisation of indigenous knowledge in favour of Western methods results in a gap in the comprehensive integration of community insights into official policies. To create a flood resilience framework that is more thorough and culturally aware, this barrier must be closed. The study emphasises the necessity of a paradigm change that acknowledges the intrinsic worth of indigenous knowledge and works to integrate it with contemporary practices.

Floods' effects on the built environment that includes habitations and vital infrastructure, highlight how key it is to approach resilience from a variety of angles. An approach that appears promising is the combination of ecosystem-based tactics and green infrastructure. Sustainable and situation-specific solutions can be achieved by coordinating indigenous practices with modern green infrastructure initiatives, such as land zoning and the utilisation of locally accessible resources. This example of the possibilities for a more comprehensive and all-encompassing flood risk management strategy is the synergy between indigenous knowledge and green infrastructure.

In conclusion, this study advocates for the elevation of indigenous knowledge as a cornerstone in rural resilience efforts. Recognising its significance, integrating it within formal disaster management, and aligning it with green infrastructure agendas can pave the way for a comprehensive and culturally sensitive approach to flood control in Zimbabwe. The study prompts a re-evaluation of current practices and calls for the coalescence of traditional wisdom and contemporary strategies to fortify rural communities against the growing challenges of floods.

CONCLUSION AND RECOMMENDATIONS

This study concludes that the country should promote the inclusion of indigenous knowledge as a fundamental component of initiatives to strengthen rural resilience. Acknowledging its importance, including it into official disaster management, and coordinating it with green infrastructure initiatives can open the door to a thorough and culturally aware flood control strategy in Zimbabwe. The study demands that present methods be re-evaluated, and that traditional knowledge and modern tactics be combined to strengthen rural communities' defences against the escalating threat of flooding. The study suggests that valuable indigenous knowledge, practices to support flood preparedness exist in rural Zimbabwe and they inform decision making in cushioning individual families from the impacts of floods. Despites the existence and the relevance of indigenous knowledge system for flood management, rural communities have to deal with the dual challenge of the disappearance of this vital knowledge system and its preservation. The study therefore suggests the following recommendations:

1. ***Integration of Indigenous Knowledge into Formal Disaster Management:*** Recognising the crucial role traditional practices play in flood resilience; modern disaster management systems must incorporate indigenous knowledge. Early warning systems, catastrophe preparedness plans, and community-based adaptation methods should all actively involve local populations and incorporate indigenous knowledge, according to government agencies, non-governmental organisations, and humanitarian partners. This partnership has the potential to improve the efficacy of flood prevention efforts and promote a more inclusive, culturally aware approach to rural resilience.
2. ***Community Empowerment and Knowledge Sharing:*** Encouraging community empowerment is crucial for flood resilience initiatives to be sustained. The creation of knowledge-sharing and community engagement platforms can promote the exchange of traditional wisdom and contemporary techniques. It is important to plan workshops, seminars, and community-led projects to foster a dynamic learning atmosphere where traditional and scientific knowledge can coexist. In addition to enhancing communities' ability to adapt, this strategy promotes a feeling of shared accountability and ownership in the face of flooding difficulties.
3. ***Incorporation of Green Infrastructure Strategies*:** The study highlights the potential of green infrastructure in enhancing flood resilience. Policymakers and urban planners should consider integrating green infrastructure solutions, such as wetlands, bioshields, and sustainable land-use planning, into flood risk management strategies. This approach

aligns with indigenous practices, harmonizing traditional ecological knowledge with contemporary green infrastructure agendas. Pilot projects and community-based initiatives can be implemented to assess the feasibility and effectiveness of these strategies within the Zimbabwean context.

4. ***Capacity Building and Knowledge Transfer:*** Capacity-building programmes are crucial for bridging the knowledge gap between indigenous peoples and institutional disaster management systems. It is important to provide training programmes that can help local disaster management organisations better identify, honour, and use indigenous knowledge. To guarantee that indigenous knowledge is passed down to future generations, efforts should be made to both document and conserve it at the same time. A more inclusive and flexible framework for disaster management is promoted by this dual strategy that makes use of the advantages of both conventional and contemporary knowledge systems.

By implementing these recommendations, Zimbabwe can develop a comprehensive and culturally sensitive approach to flood control, leveraging the strengths of indigenous knowledge and green infrastructure for enhanced rural resilience.

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