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The Role of Local and Indigenous Knowledge in Climate Change Adaptation and Mitigation in the Barotse Floodplain of Western Province-Zambia

Bernard Chileshe, Inonge Milupi*, Enock Sakala, Wiza Kabaghe, Josephine Mwendapole, Garikai M. Membele

The University of Zambia, Box 32379, Lusaka, Zambia

***Corresponding Author:** **Inonge Milupi,** *The University of Zambia, School of Education, Box 32379, Lusaka, Zambia*

Abstract: *Local and indigenous knowledge has been found to be important in fostering resilience to climate change. Therefore, the study undertook to examine how the Lozi people of the Barotse Floodplain of Western Province of Zambia apply their local and indigenous knowledge to adapt to and mitigate the effects of climate change. The study used qualitative research methods, particularly the phenomenological research design, to investigate the lived experiences of climate change among the Lozi people. Fifty-two purposively selected participants from nine cluster villages in the floodplain shared their insights, stories, and experiences on the subject. The findings show that the main adaptation strategy used by the Lozi people to adapt to climate change is relocation to the upper land during floods. Furthermore, many activities are undertaken, such as crop diversification, winter farming, and planting drought-resistant crops. It can be conclude that the local and indigenous knowledge of the Lozi people could, to some extent, be used to adapt to and mitigate the effects of climate change effectively. This knowledge can help fill the gap by integrating it into the development plans and implementation of climate change initiatives. Therefore, integrating local, indigenous and modern knowledge provides a holistic approach to adapt to the changes in climate.*

Keywords: *Climate change, indigenous knowledge, adaptation, mitigation, food security, Barotse floodplain.*

1. BACKGROUND

Human-induced climate change is a pressing global issue that demands immediate attention and action(IPCC, 2022; Kalantary, 2010).It is possibly the most significant environmental challenge of our time and poses serious dangers to sustainable development in the world, particularly in Zambia. The challenges of climate change are substantial, mainly in the developing countries where there is high reliance on climate-sensitive natural resource sectors for livelihoods, incomes and food security(Ambukege & Sakala, 2017).Its far-reaching consequences are becoming increasingly evident, posing significant challenges to the stability and well-being of nations around the world, including Zambia(Thurlow, Zhu, & Diao, 2012). The effects of climate change, among which are shifting rainfall patterns, prolonged droughts, and unpredictable floods, have disrupted agricultural productivity, and are leading to food insecurity, economic instability, and increased poverty levels in Zambia. According to Ambukege and Sakala (2017), climate change also affects other sectors of the economy such as water and energy, health, tourism and natural resources as well as infrastructure throughout Zambia. These effects are also present in the Barotse Floodplain area of western Zambia, which is the site of the current study.

Climate change refers to the long-term shifts in temperatures and weather patterns of the globe (United Nations, 2023). The shifts may be brought about by natural causes, e.g., changes in the sun's activity or large volcanic eruptions or by anthropogenic activities which pump greenhouse gases into the atmosphere. Burning of fossil fuels, particularly coal, generates greenhouse gas emissions that act like a blanket that traps the sun's heat and causes rising temperatures. The average temperature of the Earth's surface is now about 1.1^{o} C warmer than it was in the late 1800s (before the industrial revolution) and warmer than at any time in the last 100,000 years (Smith et al., 2018). According to Smith et al. (2018), human-induced global warming is presently increasing at a rate of 0.2°C per

decade. The consequences of climate change include, among many things, intense droughts, flooding, water scarcity, severe fires, rising sea levels, melting polar ice, catastrophic storms, and declining biological diversity.

Adaptation, on the other hand, is a social response to human and environmental vulnerability (Flint, 2008). For the European Commission, adaption is taking action to adjust to the present and future impacts of climate change. The United Nations Framework Convention on Climate Change (UNFCCC) defines adaption as:

> … Adjustments in ecological, social or economic systems in response to actual or expected climatic stimuli and their effects. It refers to changes in processes, practices and structures to moderate potential damages or to benefit from opportunities associated with climate change. In simple terms, countries and communities need to develop adaptation solutions and implement actions to respond to current and future climate change impacts.

The National Aeronautics and Space Administration (NASA) explains that the goal of adaptation is to reduce risks from the harmful effects of climate change, like more intense extreme weather events, or food insecurity. It also includes making the most of any potential beneficial opportunities associated with climate change, for example, longer growing seasons or increased yields in some regions. A community's adaptive capacity can be improved by investing in knowledge and information (Janssen & Ostrom, 2006; Lemos, Boyd, Tompkins, Osbahr, & Liverman, 2007).At regional and global levels, climate change mitigation means reducing the net release of greenhouse gas emissions that are warming the earth(Organisation for Economic Co-operation and Development, 2008).

Among the many ways to adapt to and mitigate the effects of climate change is to revisit the local and indigenous knowledge communities possess. According to Kasali (2011), indigenous knowledge is knowledge acquired and accumulated by communities and societies over generations and centuries by word of mouth and other socialisation processes(Mapedza et al., 2022; Milupi et al., 2019; Osunade, 1994; Warren, 1992). It covers all aspects of human life and is derived from the experiences of people within their environment, leading to the development of technologies, skills, and beliefs that are applied in various livelihood strategies, such as agriculture, medicine, and management of climatic hazards Trogrlić et al.(2019). Flavier, De Jesus, and Navarro (1995)and Membele, Naidu, and Mutanga (2022b) argue that indigenous knowledge is dynamic and not static as it changes due to the community's creativity and experimentation interwoven with knowledge from the outside.

Local knowledge is the knowledge that is possessed by people in a community as a result of living in a place for a considerable period (Membele, Naidu, & Mutanga, 2022c). Indigenous knowledge continues to be helpful in weather forecasting and prediction (Zuma-Netshiukhwi, Stigter, & Walker, 2013), flood prediction (UNEP, 2008), disaster preparedness (Maferetlhane, 2013) and information sharing (Muyambo, Bahta, & Jordaan, 2017). Mavhura, Manyena, Collins, and Manatsa (2013) and Membele et al. (2022c) argue that indigenous knowledge fosters participation and helps communities deal with challenges in their local context.

The local knowledge is intertwined in the practices, institutions and relationships within a particular community (Ngwese, Saito, Sato, Boafo, & Jasaw, 2018). According to Amoako (2015) and Membele et al. (2022b) local knowledge helps to improve people's adaptive capacity and resilience to climate change. This is because it helps communities to understand the factors that cause damages caused by floods as well as their vulnerability to flood hazards (Mavhura et al., 2013; Membele, Naidu, & Mutanga, 2023; Musungu, Motala, & Smit, 2012).However, some practitioners in Africa have often despised local and indigenous knowledge because it is undocumented and cannot be scientifically validated (Dube & Munsaka, 2018; Kasei, Kalanda-Joshua, & Benefor, 2019). However, Chanza and De Wit (2016) and Membele, Naidu, and Mutanga (2022a) contend that local and indigenous knowledge should not be ignored in efforts aimed at adapting to climate change in a particular geographical area. It is for this reason that the United Nations Office for Disaster Risk Reduction (UNISDR), the World Conference on Disaster Reduction and the Sendai Framework for Disaster Risk Reduction 2015–2030 called for the use of indigenous knowledge as it is important in protecting people at risk of the effects of climate change(UNDRR, 2005).

Many studies have been done on the use of indigenous knowledge to resolve environmental problems. Some areas of research interest have been soil erosion, rangeland degradation, desertification, climate change, and community-based natural resources management (Namafe & Chileshe, 2013; Mapedza et al., 2022). According to Mapedza et al., some research approaches have sought to problematise indigenous knowledge while other researchers have argued that indigenous knowledge offers a new methodological approach to engaging rural communities as citizens in their development trajectory. Mapedza et al., Sillitoe (1998) and Davis (2005) argue that by engaging indigenous knowledge, we will be better positioned to have environmentally appropriate and socially just development outcomes. With the advent of climate change and its effects, the use of local and indigenous knowledge cannot be over-emphasized especially in the Borotse Floodplain.

The Barotse Floodplain is one of the natural environments severely impacted by climate change. It is located in the Western Province of Zambia, astride the Zambezi River, and is domiciled by the Lozi-speaking people, described by Namafe and Chileshe (2013) as the 'water people' because of their affinity with water. Over the centuries, the Lozi people have been able to adapt to their environment through the invention of different customs and traditions as well as life skills that are still part of their daily lives(Milupi, Moonga, & Chileshe, 2020).As a result, they have been able to maintain and sustain their indigenous practices of cultural traditions that have existed for centuries (Neeta, 2016).

One of the traditions that the Lozi people still have, and which has helped in the conservation of natural resources in the area, is a strong establishment of traditional leadership which runs side-by-side and complements the national governance system. The Barotse Royal Establishment (BRE), headed by the *Litunga* (King) is responsible for the management of natural resources (Neeta, 2016). Below the Litunga are senior chiefs who are responsible for education, agriculture, and management of floods, among other responsibilities (Mapedza et al., 2022). The annually held *Kuomboka* ceremony, which involves the King and his people relocating to higher ground when the plains flood, is another enduring practice that the Lozi people have used to adapt to an environment which is prone to unpredictable fluctuations in weather patterns.

In terms of agriculture, to adapt to the environment, the Lozi people have developed eight different cultivation systems that were designed to take advantage of the floodplain environment, such as a variety of soil types, anthills, forests, thickets, and a continuous supply of moisture from the floodplain. These garden types are used to grow a variety of crops such as bulrush millet, maize, cassava, sweet potatoes, pulses, fruit trees, sugar cane, tobacco, and vegetables allyear round. Furthermore, the Lozi people have applied indigenous knowledge to their traditional fishing methods, and the hunting of wild animals and birds. They know when to catch fish and when to impose a fish ban, when to catch birds and when to allow the birds to breed, and when to hunt for animals and when not To (Milupi et al., 2020).

Neeta (2016)posits that another important feature of the traditional practices of the Lozi people are canals which have been in existence on the plain for many years. The over 3,000 canals still serve multiple uses, including navigation, drainage, fishing, and irrigation. According to Neeta, the canals serve as the nerve centre of the people's socio-economic livelihoods.

Specifically on climate, a study by Mapedza et al. (2022) noted that there are several important local knowledge systems employed by the Lozi people that are early warning systems based on observations of weather, water level and landscape, and animal behaviour, which are widely disseminated through a specific communication network.

The Lozi people have a long history of successfully adapting to their environment and acquiring valuable indigenous knowledge that helps them in navigating changes and challenges within it. However, there was a need to conduct a comprehensive analysis of the current methods of climate change adaptation and mitigation in the Floodplain and to contribute to the growing body of knowledge on the effects of climate change in the Barotse Floodplain. Therefore, the first objective of this study was to identify the climate change-related events in the area and their effects. The second objective was to describe specific local and indigenous knowledge-based practices employed by communities living on the Floodplain to adapt to and mitigate the effects of climate change.

2. STUDY AREA

The study area is the Barotse Floodplain, which is in the Western Province of Zambia, as shown in Figure 1.

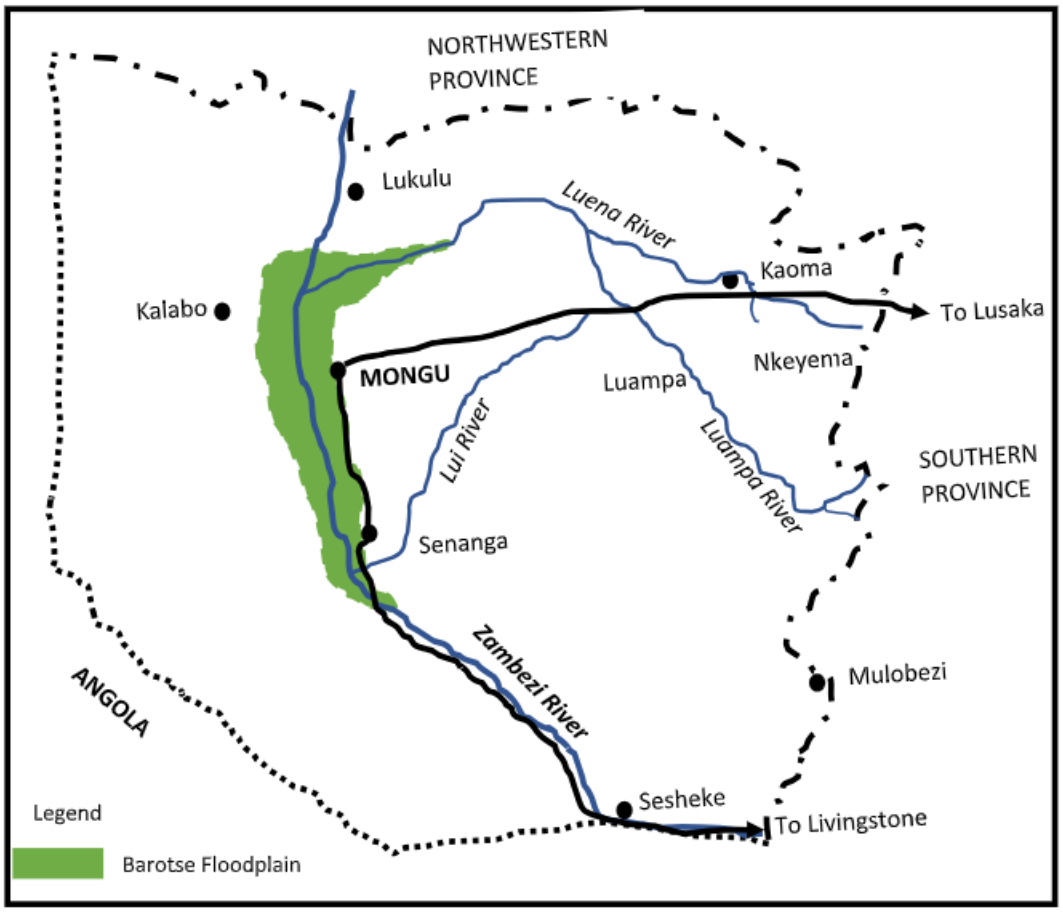

Figure1. *The location of Mongu and the Barotse Floodplain in Western Province.*

The Barotse Floodplain is also known as the Bulozi Plain, *Lyondo,* or Zambezi Floodplain(Milupi et al., 2019). It is a vast wetland located in the upper Zambezi River Basin in the Western Province of Zambia (Zimba et al., 2018).With a total of approximately 250,000 people, the floodplain spans approximately 5,500 km^2, with a maximum flooded area of around 10, 750 km^2. The ecological region is relatively flat and stretches from Lukulu to Senanga, covering a distance of approximately 230 km and a width of about 30 km, making it the second largest wetland in Zambia, after the Bangweulu Swamps (Xueliang, Haile, Magidi, Mapedza, & Nhamo, 2017).

The coordinates of the region are 15°40'0"S and 24°10'0"E (K. Banda et al., 2023).The area supports a diverse array of flora and fauna, including fish, birds, and reptiles. The rainy season lasts from October to April, with the wettest months being December and January. The flood season occurs from February to May, with peak water levels occurring in April and beginning to recede from May to July. During November, when water levels are at their lowest, the region still contains many lagoons, swamps, and channels (Milupi et al., 2019).

According to Banda, Banda, Sakala, Chomba, and Nyambe (2023) the Barotse Floodplain has experienced some considerable land use change over the past years. It has also experienced reduced rainfall with the lowest being 571.7mm in 2015 and the highest being 1,579 mm in 2008. The floodplain has an average rainfall of 879.6.

The selection of the Barotse Floodplain as the research area was driven by its exceptional vulnerability to the impacts of climate change. Neeta (2016)explains that the Barotse Floodplain is one of the most vulnerable physical environments in Zambia. The region's climate has become increasingly variable and unpredictable, with changes in rainfall patterns and extreme weather events

such as droughts and floods becoming more frequent. Consequently, the livelihoods of the people in the area have been affected, and their ability to adapt to these changes is crucial (Flint, 2008). Therefore, the overarching goal is to identify strategies that can be most effectively employed to mitigate the profound consequences of climate change in this particularly vulnerable region. The strategies may include those that the local people have used over a long period of time. For example, the region is renowned for the outstanding indigenous technical systems of food production (Kasali, 2011). This makes it a perfect research environment for the investigation of their applicability in the context of climate change.

3. METHODOLOGY

The study used qualitative research methods, particularly the phenomenological research design to collect data. The approach was employed because it enabled the researchers to have an in-depth understanding of and gain significant insights into the significance of the local and indigenous knowledge among the people living in the floodplain. Before going into the field, the researchers conducted an extensive review of the literature, focusing on local and indigenous knowledge as well as past research within the Barotse Floodplain. The prior information obtained through this method was useful for making decisions about what needed to be done in the field. In the field, primary data was collected primarily using face-to-face interviews. Fifty-two purposively selected participants from nine cluster villages in the floodplain were interviewed; the villages were carefully selected by an Induna (elder) from the Litunga's palace and only people deemed to be knowledgeable in local and indigenous knowledge were interviewed. The villages were Ilyala, Sifwambai, Ljyeno, Namikelako, Indoo, Siwito, Lealui, and Masheye. The research looked at how local people identified climate change-related events, and how the communities in the floodplain adapted to and mitigated the effects of climate change.

4. RESULTS

4.1. Identification of Climate Change-Related Events

The respondents were asked to identify climate change-related events that took place in their area. This question was important because understanding climate change-related events may help people prepare for exigencies that may occur in their local environment. The responses are shown in Table 1.

Table1. *Identification of climate change related events.*

s/n	Climate related events in the area
1.	Increase in atmospheric temperature (to about 40^{o} C) leading to excessive heat in the plains.
2.	Floods
3.	Reduction in precipitation and increase in dry spells
5.	Unexpected changes in seasons and their durations; unpredictable rainfall patterns
6.	Reduction in food production, food insecurity, water supply, and income
7.	Outbreak and increase in livestock diseases and heat stress in livestock
8.	Depletion and extinction of some species of plants, insects, fish, and animals.
9.	Erosion of indigenous cultural and social life of the Lozi people, suspension of the annual traditional Kuomboka ceremony due to insufficient water in the plains in recent years
10.	Forces people to have two homes, one in the plains and another one on the upland
11.	Has brought waterborne diseases (e.g., diarrhea) and malaria in human beings
12.	Destruction of buildings and infrastructure

The interviews conducted reveal a wide array of effects resulting from the impact of climate change on the Barotse Floodplain. These effects can be divided into climatic (drought, floods, increased temperature/excessive heat, variable length of seasons), environmental (depletion/extinction of plant and animal species, waterborne diseases), socio-economic (reduction in food production/income, erosion of indigenous culture, cancellation of cultural activities, people forced to have two homes and destruction of homes and infrastructure).

4.2. Using Local and Indigenous Knowledge to Adapt to and Mitigate the Effects of Climate Change

The respondents were also asked to state how they used local and indigenous knowledge to adapt to and mitigate the effects of climate change. Table 2 shows the responses that the respondents provided.

Table2. *Responses on mitigation and adaption to climate change.*

s/n	Adaptation	Climate-change related event
1.	Developing innovative water-harvesting and management techniques (e.g., small-scale dams, bunds, and ditches) to capture and store water.	To control water levels during the flood season, prevent excessive flooding of agricultural fields and minimize erosion.
2.	Developing skillful water management systems (e.g., canals, dykes, and channels).	To help manage flood-waters, regulate the flow of water to crop fields, and minimise soil erosion.
3.	Developing indigenous crop varieties that are adapted to the region's climatic conditions (droughts, pests, and diseases).	To deal with problems of droughts, pests, and diseases.
4.	Preserving seeds of climate-resilient crop varieties for future use.	To ensure these seeds are available for future generations.
5.	Afforestation	To replace vegetation which has been removed.
6.	Seasonal movement of people and their animals to the plateau (*Kuomboka*) when floods come and back (*Kufuluhela*) when the floods recede.	To avoid floods, to allow pastures to regenerate.
7.	Building dwellings on raised embankments.	To lessen the impact of floods.
8.	Using reeds and cow-dung for cooking.	
9.	Using traditional methods of fishing.	
10.	Using natural manure (cow-dung) to fertilise of crops.	
11.	Using traditional methods of preserving food, e.g., drying fish in the sun or with salt as well as smoking.	
12.	Enforcing customary fish bans and restricting tree-cutting.	To avoid overfishing and deforestation.
13.	Using traditional way of building dwellings with mud and grass (reeds).	
14.	Sensitising communities about climate change and its effects.	
15.	Aquaculture	
16.	Seeking intervention of ancestral spirits	
17.	Building near rivers that do not dry up.	To prepare for drought conditions.
18.	Using new irrigation methods for farming to sustain agriculture.	
19.	No efforts are being made to mitigate climate change	

The study shows that communities on the plain reported undertaking several mitigation and adaptation practices to counteract the effects of climate change. For climate-related events, communities reported irrigation, temporary migration, building dwellings on raised mounds, building close to perennial streams, developing drought-resistant crops, seeking ancestral intervention, and skillful water management. For environmental events, the respondents reported afforestation, fish bans, and tree-cutting bans. Concerning socio-economic events, alternative social and economic activities were reported, such as moving away from crop farming to other economic activities, for example, aquaculture, planting trees, growing more climate resilient varieties of crops and keeping climate change-resilient animals. To avoid destruction of homes and infrastructure, dwellings are now constructed on raised ground or mounds.

5. DISCUSSION

The climate of the Barotse Floodplain is characterised by extremes which appear to be on the increase. According to Flint (2008), the increasing extremities in climate on the plain are causing uncertainty and confusion. Through interviews with respondents from across the Barotse Floodplain, many coherent answers on both the effects of the changing climate and indigenous practices in the area were identified. Most of the respondents showed an understanding of their environment and possible adaptation and mitigation strategies. It can, therefore, be asserted that communities in the Barotse Floodplain are actively responding to the effects of climate change in their environment (although some respondents felt nothing is being done to mitigate the effects of climate change). The

enigma lies in isolating what responses constituted indigenous knowledge and what was Western (modern) knowledge. For example, one of the answers that was most closely related to the indigenous practices of the Lozi people was the relocation (*Kuomboka*) to the upper land during floods, a tradition that has been observed for centuries. Another answer related to the enforcement of fish bans and restriction of tree-cutting through traditional legal systems to contribute to ecological conservation and sustainable resource use. Ignoring these rules resulted in monetary fines enforced through traditional government bodies, such as the chiefs. Although these were claimed to be part of indigenous knowledge since they were invoked through the traditional legal system, it is worth questioning whether these practices have evolved over time due to climate change or have remained the same as in past centuries, which would suggest that they are not specific adaptations to climate change.

The study also shows that, in examining the understanding of indigenous knowledge in the context of climate change, not all the respondents had a clear grasp of its meaning. Responses showed that, apart from adapting to changes in the climate, communities in the Barotse Floodplain were also mitigating the effects of climate change in many ways. They were diversifying their farming activities through winter farming, along with planting drought-, pest-, and disease-resistant crops like cassava to ensure food security. Similarly, wells were being dug and fishponds were created to sustain water availability for domestic and agricultural use, and to provide additional fish to the communities. But, so far, these are not necessarily indigenous practices that respond to the research question of this study. Others reported planting non-traditional crops like cassava, groundnuts, and sweet potatoes, which are also not considered part of local knowledge. Concerning declining food production, the respondents reported moving away from crop farming to other economic activities, such as fish farming (aquaculture). However, these responses were equally not responding to the question of indigenous knowledge. The same is true for diversifying livestock farming to include pig-keeping, which was not previously done on the flood plain. Therefore, it is crucial to ensure that respondents have a clear understanding of indigenous knowledge and its relevance to climate change.

To forestall drought, one of the techniques that the communities started to use are new irrigation methods for farming to sustain agriculture during periods of inadequate rainfall, which were not used before the climate changed. The respondents reported that gardens were irrigated using water from the rivers on the plain. Additionally, pumps were used for water management during droughts which enhanced agricultural sustainability. It is worth noting that irrigation, despite being mentioned multiple times, is not an indigenous practice per se, since it has been newly established since climate change and uses modern pumps. This could also be true concerning the use of drought-, pest-, and disease-resistant varieties of crops and tolerant breeds of animals. It is for reasons like this that some scholars have advocated for mixing indigenous and modern knowledge when dealing with issues of climate change.In any case, Oguamanam (2006) describes western culture as a local tradition which has been spread worldwide and claims that scientific knowledge absorbed certain European folk knowledge and practices during its creation in the 18th and 19th centuries. The finding may be at variance with the assertion by Neeta (2016)and Milupi et al. (2019)that the Lozi people have been able to maintain and sustain their indigenous practices of cultural traditions that have existed for centuries. There have been many innovations in conformity with modern knowledge while other practices may have remained unchanged, not necessarily responding to the dictates of climate change. This is the view presented by Mead (2005) that the Maori knowledge system today is a mixture of traditional knowledge and knowledge inherited over time from exposure to European culture. This also affirms the view that indigenous knowledge systems are dynamic as a result of both internal and external influences (Flavier et al., 1995; Membele et al., 2022b).

Respondents in the study also indicated that they were taking steps to raise awareness about climate change and related practices in their communities. They discussed the importance of sensitising community members to the impacts of climate change to enhance their sense of responsibility and increase their alertness to the changes in climate. By educating community members about climate change, the respondents hoped to inspire action and promote positive behaviour change that will help to mitigate the effects of climate change and protect the planet for future generations. Additionally, the respondents emphasised the need for ongoing education and outreach efforts to ensure that their communities remained engaged and informed about climate change issues over the long term. In this

regard, the concern may be with the format which is used during sensitisation activities, whether it is indigenous or modern. According to Mapedza et al. (2022), Milupi et al. (2019), Oguamanam (2006), Osunade (1994) and Warren (1992), the manner of the transmission of indigenous knowledge is mostly orally based, that is, through folklores and legend, or imitation and demonstrations, and gained by observing and participating in simulations, real-life experiences and trial and error. Therefore, when the sensitisation is done through writing (word, pictorial, or graphical) and imbibed in abstraction, this could be regarded as a combination of indigenous and Western science.

It is crucial to highlight that even all the practices identified may not be enough to deal with the impacts of climate change. As Flint (2008)argues, "it may also result in realising that even after remembering and adding up all the cumulative knowledge, skills, and coping strategies employed to date, that is not enough to deal with current exigencies or to achieve community aspirations in the context of survival or sustainable socio-ecological development." So, even by employing indigenous knowledge to adapt to and mitigate the impacts of climate change, not all challenges will be addressed sufficiently. The same situation was found in the field, where multiple issues related to climate change were simply not mitigated and adapted to because there was no knowledge of the same. This finding justifies the assertion by some respondents that no efforts were being made to mitigate climate change. This line of argument entails that the effects of climate change are there to stay.

It can therefore be argued that the concept of indigenous knowledge is often romanticised. While it is undoubtedly a useful concept, it is important to recognise that it does not possess any sort of miraculous powers, that is, it is not a magic wand or panacea. In other words, indigenous knowledge can only go so far in solving the complex issues of climate change faced today. That being said, the contributions that indigenous knowledge can make towards our collective understanding of the world should still be valued. However, it is not to be seen as one of many tools in a tool kit that can help navigate the complex challenges that the world is facing.

6. CONCLUSION

The study conducted a thorough analysis of the local and indigenous knowledge of the Lozi people who reside on the Barotse Floodplain area of the Western Province of Zambia. The changing climate patterns, such as unpredictable rainfall, extreme flooding and droughts, have had significant impacts on the livelihoods of the local communities. These circumstances have made it imperative to adapt to the new situations. The findings are that a lot of activities and initiatives are being undertaken by the occupants of the plains to adapt to and mitigate the effects of climate change. However, these activities are not solely indigenous knowledge based; some are characteristic of modern knowledge. It can, therefore, be concluded that the people are using a mix of both indigenous and modern knowledge.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are made:

1. There is a need to promote the use of local and indigenous knowledge alongside modern methods to create a more holistic approach to climate change adaptation that draws on the strengths of both traditional and scientific knowledge.
2. The Government should work in partnership with local communities, especially women, to espouse adaptation measures that will be favourable to livelihoods.
3. Encourage communities to replant trees, protect wetlands and deject the undiscerning cutting of trees because of the effects on the rain cycle.
4. Government should promote alternative livelihoods for the welfare of the local communities and promotion of nutrition and poverty reduction measures.
5. The findings of this study should be applied in making policy decisions which will guide in the development of climate change adaptation strategies tailored to the needs of the local communities of the Barotse floodplain.

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