AN AFROCENTRIC APPROACH TO CLIMATE CHANGE ADAPTATION: INDIGENOUS SEASONAL PREDICTORS AMONG NDAU PEOPLE IN CHIMANIMANI IN ZIMBABWE

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Abstract

Purpose - The effectiveness of scientific seasonal weather forecasts as a tool to help rural communities in Zimbabwe make decisions is under continuous debate. This persists due to rural communities' ongoing difficulty accessing scientific weather forecasts, early warning systems, and remote sensing technologies. As a result, rural people continue to rely on the repository of their indigenous knowledge systems for decision-making, seasonal prediction tools, and weather change measurement. This study employs Afrocentric lenses to explore the indigenous seasonal predictors used in rural Zimbabwe to forecast seasonal changes and weather patterns, as well as the climatic variations that these predictors can explain.
Design/methodology/approach - The study employed Afrocentric data generation tools such as transect walks and talking cycles. Thematic Content Analysis was used to analyse data.
Findings -The study identifies indigenous practices of naming months, typologizing rainfalls, and weather forecasting based on fauna and flora, and discusses how climate change has been perceived by drawing on these practices. Moreover, the seasonal predictors were closely intertwined with food production and overall resilience in the face of changing climate. The paper concludes that both research and practical support for climate resilience should start with indigenous ideas and practices related to responding to changing climate conditions, along with scientific meteorological knowledge.
Originality- This study underscores the importance of Indigenous knowledge in addressing climate risks. It emphasizes the value of indigenous weather predictions, which predate modern weather stations and have long benefited rural communities. Integrating this knowledge into adaptation policies and practices can lead to more effective and resilient responses to climate change.

Key Words: Indigenous Knowledge, Climate information, Weather Foresting, Seasonal predictors, Afrocentricity, Climate Change Adaptation, Africa.

Paper type Research paper

Introduction

Southern Africa is regarded as one of the hotspots of the impact of climate change as it has grown synonymous with climate-related disasters (IPCC, 2022; Ayugi *et al*., 2022; Scholes and Engelbrecht, 2021). This has resulted in millions of people at risk of acute food insecurity and reduced water security due to the impacts of rising weather and climate extreme events. These effects are particularly felt by indigenous peoples, low-income households, and small-scale and indigenous food producers, with children, the elderly, and pregnant women being the most affected (IPCC, 2022; Nyahunda *et al*., 2017). Consequently, various governments, communities, and organizations are making efforts to adapt to climate change. The Intergovernmental Panel on Climate Change (IPCC) (2014) and IPCC (2019) reports called for an increase in recognition and promoted the use of indigenous knowledge to improve adaptation and create resilient communities. Accordingly, research on climate change has emerged on indigenous knowledge systems (IKS) (IPCC, 2022). Among this literature, one focus has been seasonal predictors based on indigenous rather than scientific meteorological knowledge (Mushimbei and Libanda, 2023; Ankrah *et al*., 2022; Mafongoya *et al*., 2021). This article contributes to this literature from an Afrocentric perspective, focusing on indigenous seasonal predictors among the Ndau people in Zimbabwe.

The Afrocentric philosophy urges African people to be seen as agents, actors, or subjects in human history (Asante, 1980) and refutes the view that Africans stand on the margins of the world's history-making process. Similarly, African people should exercise agency when confronting challenges that face the world for instance environmental challenges such as climate change and its related disasters. In response to climate change, African people rely on indigenous knowledge repository gathered over generations of people (Apraku *et al*., 2021; Mafongoya *et al*., 2021; Zvobgo *et al*., 2022; Leal Filho *et al*., 2022). Therefore, from an Afrocentric point of view, indigenous knowledge of African communities has historical significance and could be used to assist people in adapting to climate change in a meaningful and socially acceptable manner (Tirivangasi and Nyahunda *et al*., 2024).

However, indigenous knowledge is frequently criticized based on arguments that its effects vary by region, are unique to a particular social group, and thus, its application in other contexts is more difficult (Apraku *et al*., 2021). To contrast this critique, the Afrocentric tenet of "location or centeredness" requires Africans' position to be at the centre of analysis, which is to be rooted in a historical and cultural context (Conyers Jr., 2004; Mugambiwa *et al.*, 2023). Therefore, we argue that diminishing the role of indigenous knowledge in climate change adaptation efforts results in the displacement of the African narrative in the climate change discourse. Further, we suggest that the value of indigenous knowledge is not constrained by its lack of scalability, as it is intended to benefit the people of its context or origin. When it comes to adapting to climate change, not all solutions should be scaled because their applicability varies depending on the circumstances and is of great value for creating climate adaptation and resilience. This Afrocentric study investigates indigenous knowledge practices utilised by the Ndau people to predict and measure weather change and kinds of climatic changes that have been perceived based on these indigenous knowledge systems, and how they are used in decision-making.

Afrocentric approach to investigating indigenous knowledge for climate prediction and weather forecasting.

The Afrocentric theory emphasizes historicity, centeredness, and culture as key tenets for analyzing climate adaptation among the Ndau people in Zimbabwe. It advocates for African people to reassert agency and engage in self-reflection to achieve meaningful lives (Asante, 2003). This framework underpins the study's effort to document the Ndau people's experiences with climate change, emphasizing that indigenous communities cannot rely solely on external assistance to address climate impacts (Wily, 2018; Ramos-Castillo et al., 2017). African Indigenous Knowledge, like other cultural epistemologies, plays a crucial role in rural communities' weather forecasting and climate prediction efforts. Zimbabwe's dependence on rain-fed agriculture makes climate prediction vital, as the country's economy and food security are highly susceptible to climate variability (Ndlovu et al., 2020; Makuvaro et al., 2023). Seasonal climate forecasts, including precipitation levels, temperature variations, and extreme weather events, guide farmers in making informed decisions. These forecasts help mitigate risks and optimize agricultural productivity (Siders & Pierce, 2021). While scientific forecasts have potential, their accessibility and relevance for rural communities remain limited. Thus, Indigenous knowledge offers an indispensable tool for complementing scientific meteorological data (Zvobgo et al., 2022; Leal Filho et al., 2022).

Indigenous forecasting practices remain integral to rural African communities, where modern communication channels for weather updates such as radio, television, and newspapers are inaccessible to many. Language barriers and economic constraints further reduce their effectiveness, especially for marginalized rural populations (Mafongoya et al., 2021; Mapfumo et al., 2016). As a result, Indigenous knowledge remains a trusted source of weather information. Farmers, particularly in rural areas, rely heavily on this knowledge to understand weather patterns and adapt their agricultural practices accordingly. The lack of agro-meteorological information is a significant barrier for rural farmers, compelling them to depend on personal memories of past climate events and anecdotal evidence for agricultural planning (Paparrizos et al., 2023). Over the past two decades, this reliance has been challenged by increasing discrepancies between rainfall patterns and agricultural yields. For instance, despite substantial rainfall in 1999, 2003, and 2004, maize productivity in Zimbabwe was suboptimal, eroding farmers' trust in scientific forecasts. Compounding this issue, political interference has skewed rainfall projections for political gain, creating further mistrust (Mapfumo et al., 2016; Manatsa et al., 2012).

In response, Indigenous communities have developed climate adaptation strategies rooted in their cultural and ecological knowledge. Various indicators are used in traditional weather forecasting, including bird migration, wildlife movement, astronomical constellations, wind patterns, and cloud formations (Zuma-Netshiukhwi et al., 2013; Ifejika Speranza et al., 2010). Observing events around geographic landmarks, such as Mount Kilimanjaro, also offers insights into impending climatic changes (Ifejika Speranza et al., 2010). These methods are tailored to specific environments and are well-suited to the localized needs of rural communities. Integrating scientific and Indigenous knowledge systems can enhance climate resilience, particularly in vulnerable rural contexts. Indigenous knowledge provides culturally relevant, localized insights that are often overlooked by conventional scientific approaches (Berkes, 2012). However, challenges such as epistemological differences and communication gaps can hinder effective integration (Nyong *et al.*, 2007). Nonetheless, participatory frameworks respecting Indigenous knowledge while leveraging scientific accuracy show promise. For instance, studies by Nakashima *et al.* (2018) and Ajani *et al.* (2013) highlight the potential for collaboration to improve climate forecasting and adaptation strategies.

Afrocentricity critiques the marginalization of African cultural knowledge by Eurocentric systems and emphasizes reclaiming Indigenous practices (Asante, 1998; Adeleke, 2015). Historical processes such as colonization and modernization have dislocated African people from their cultural roots, resulting in the erosion of Indigenous knowledge systems. This dislocation has led to the loss of valuable insights into how African communities historically adapted to climate changes. This study adopts an Afrocentric lens to document the Ndau people's Indigenous knowledge on climate prediction and weather forecasting. By doing so, it contributes to reconstructing and disseminating this knowledge for current and future generations. Emphasizing the integration of Indigenous and scientific knowledge systems, the study advocates for adaptive strategies that address the unique challenges faced by rural African communities in navigating climate change.

Methods

The research site

The study was conducted in Chimanimani District, southeastern Manicaland, Zimbabwe, home to the Ndau people. Chimanimani receives up to 1,400 mm of rainfall annually (Chingombe and Musarandega, 2021) and supports crops like maize, millet, groundnuts, and potatoes. Covering 3,450.14 km² with a population of approximately 134,939 (Mutandwa *et al.,* 2019), its rugged topography rises to 600 meters above sea level and features peaks, ravines, timber, and tea plantations. The district's rural economy is dominated by agriculture. Positioned along cyclone pathways from Mozambique and the Indian Ocean, its rocky terrain limits cyclone movement but makes it highly storm prone.

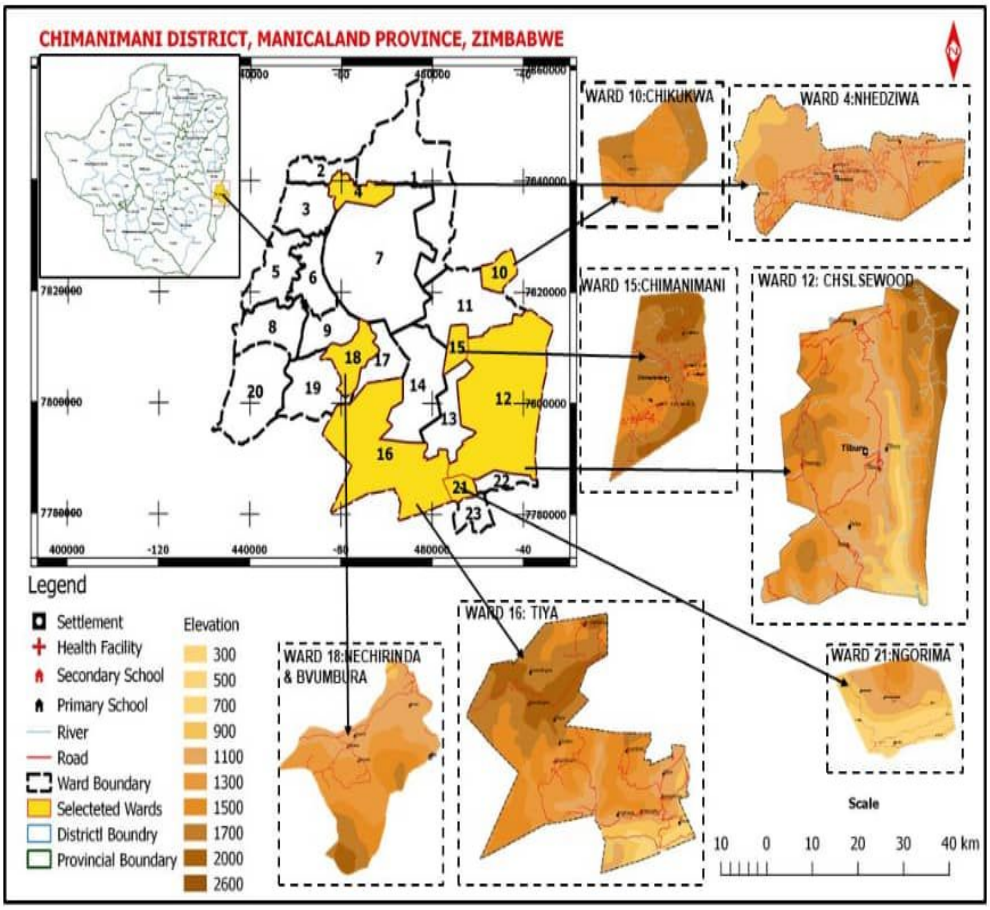

Figure 1. The study area is located in Chimanimani, Manicaland Province, Zimbabwe.

Source: Authors

Identification of research participants and data generation

The Chimanimani district was selected because of its extensive indigenous knowledge systems and the visible impacts of climate change. The study was conducted in seven specific areas known as wards: Chikukwa (Ward 10), Charleswood (Ward 12), Chimanimani (Ward 15), Tiya (Ward 16), Nhedziwa (Ward 4), Nechirinda and Bvumbura (Ward 18), and Ngorima (Ward 21), displayed in Figure 1. The Afrocentric protagonist Pellerin (2012) argues that Afrocentric researchers must remain aware of the agency of African people and must take care to involve a proportionate sample size. From the seven wards, all together seven (7) village heads (*Mutape*), and eighty-four (84) community household heads participated in the study (a total of 91 participants). The study drew on an Afrocentric approach in selecting methods of data generation in interaction with indigenous communities.

These included transect walks and talking circles. A transect walk refers to a methodological approach wherein the researcher engages in a mobile interview, commencing from the central area of a village and extending towards the periphery of the territory. The researcher was accompanied by a group of local research informants who possess a high level of expertise in matters of ecological concerns. The researcher and informants collaboratively engage in the observation of various micro-ecological niches and engage in discussions about shared interests. The researcher engaged in a process of observation, inquiry, and active listening to ascertain the knowledge and perspectives shared by the informants. The utilization of transect walks served as an optimal starting point for researchers' endeavour due to their ability to establish the participants as knowledgeable authorities in the field of climate change. The researcher conducted transect walks with fourteen (14) selected participants from a pool of household heads who attended talking cycles in seven (7) wards. On each ward, the researcher conducted transect walks with two (2) participants in the aftermath of every talking cycle. In addition, more transect walks were conducted with seven (7) village heads found in selected wards. This was done to collect comprehensive data on community perceptions of climate change and the adaptation mechanisms implemented.

The study utilized conversational or discursive techniques, specifically known as talking circles in the research literature (Mthembu, 2021). In African and indigenous settings, talking circles are created during diverse activities such as gathering around a hearth, commemorating, vocalizing, or engaging in recreational activities. In these circumstances, individuals communicate without any form of interruption. Talking circles promote the exchange of ideas, mutual respect, solidarity, and lasting compassion and love among participants, representing the equal status of all members. Usually, a sacred item such as a feather, shield, stone, basket, or spoon is transferred from one speaker to another within the circle. Data from community household heads was collected using this manner in all wards with each session comprising six households' heads of Ndau origin bringing the total of chosen participants to eighty-four as the researchers held two (2) sessions per each ward. Throughout the conversations, researchers collected historical accounts of climate change adaptation and the perspectives of community members regarding changing climate.

While the use of culturally congruent methods, such as talking circles and transect walks, provided rich insights into the indigenous knowledge systems of the Ndau people, the data collection process was not without its challenges. During the data collection period in Chimanimani, the wet conditions in this mountainous area presented significant logistical difficulties. Traveling by car often proved problematic, as vehicles would become stuck in muddy terrain, requiring frequent stops to navigate reeling wheels. Walking during transect walks was equally challenging, particularly when accompanied by elderly participants. Time was also a critical factor, as the onset of rain could make it nearly impossible to return safely, requiring careful planning and monitoring of the weather. In talking circles, group dynamics occasionally introduced biases, as certain individuals already regarded as highly knowledgeable by the community tended to dominate discussions. While their contributions were invaluable, their prominence sometimes limited input from less vocal participants. Despite these challenges, efforts were made to mitigate these issues through strategic facilitation and inclusive questioning techniques to ensure diverse perspectives were captured.

The study was conducted in adherence to strict ethical guidelines as stipulated by University of Jyväskylä ethical guidelines to ensure no harm to individuals or the communities involved. Before data collection, informed consent was obtained from all participants, with clear explanations of the study's purpose, procedures, and their right to withdraw at any time. Confidentiality and anonymity were maintained by securely storing data and removing any identifying information from the analysis and publication. Participation was entirely voluntary, and efforts were made to minimize any potential risks or discomfort to participants during the research process.

Data analysis

The study employed reflexive thematic analysis within an Afrocentric framework to analyze and interpret the data. Pellerin (2012) highlights the importance of preserving the integrity of African cultural elements in research. Accordingly, the coding process was guided by African contexts, ensuring that Ndau words and cultural references were retained to maintain authenticity. Using criteria irrelevant to African contexts could distort the findings and compromise the data's integrity. This approach allowed researchers to uncover hidden meanings and provide contextual explanations (Braun and Clarke, 2021). The analysis followed Terry et al.'s (2017) outlined steps and began during data collection. Participants shared perspectives on climate change, including observed weather changes, indigenous species, and adaptation strategies, with a focus on annual precipitation patterns and the use of traditional calendars. Transcripts were systematically analyzed, and findings were reviewed through discussions with research assistants to ensure depth and accuracy (Patton, 2014).

Results and discussions

This section discusses the results of the data analysis and the overall engagement with the rural communities in Chimanimani in response to the questions regarding their indigenous ways of perceiving climate, predicting weather, and its changes, and how the community uses observations of fauna and flora as indicators for seasonal change.

Ndau people’s indigenous annual calendar months ‘names’ as predictive indicators for weather and climate

The Ndau people attach great significance to the months of the year, as they determine their understanding of seasons and the passing of years. The daily temperatures determine the pattern of existence, molding their daily experiences. These months were not just named, however, each month in Ndau vernacular language indicates the expected weather patterns and changes that signify the climate or weather change. As such, gaining knowledge of community members on this has enabled the researcher to gain knowledge of the perceptions of community members on the changing climate. In Table 1, the Ndau calendar is shown:

Table 1. Seasons and months concerning climate in Chimanimani, Zimbabwe

Ndau and English names for months	Seasons of the year	Description in detail – meaning and selected events
January - “*Ndira*”	Summer is also known as “*Zhizha*”- green farm produce will be in abundance.	In Ndau, the term ‘mwedzi weNdira refers to the month of the beetles. Beetles were seen in large numbers. The first month of the year coincides with the mid-rainy season. During this time, ‘*Manyukira*’ natural springs are visible in Chimanimani because of the moist terrain. Some people referred to this rain as ‘*Dundiramudendere*’, implying that they were urinating on the exterior of their houses due to the heavy rain.
February - “*Kukadzi*”		During February, weather conditions typically consist of cloudy skies and a notable amount of rainfall. Additionally, crop varieties that were planted in the early stages of the season reach maturity by February, and the harvesting process commences.
March - “*Kurume*”	Autumn - “*Masutso*”	Oftentimes, food stocks would become depleted, leading people to venture into the nearby forests in quest of fruits.
April - “*Bandwe/Kubvumbi*)”		‘*Kubvumbi*’ is the name given to the light rain showers that occur during this month. First crop ceremonies and harvest ceremonies are carried out at the specific times that are deemed proper.
May – “*Chivabvu*”	Winter – “*Chando*” *Chando* simply means coldness	*Chivabvu* – This term refers to the last green maize harvested before summer ends. During this time, farmers harvest the remaining maize and declare their harvest's success. The month's name is inspired by this activity.
June – “*Chikumi*”		The temperature is quite low, making it difficult to engage in farming activities. Farmers in a variety of areas finish harvesting their crops.
July – “*Chikunguru*”		Its name comes from the *Flacourtia indica* wild fruit, known as Nhunguru. The redness of ‘*Nhunguru*’ fruit blends with blooming *Munhondo (Julbennadia globiflora*) and *Musasa* (*Brachystegia spiciformis*) trees, signalling the beginning of summer.

August – "*Nyamavhuvhu*"	Spring – "*Chirimo*" A period without fresh green produce from the farm, but abundant food for livestock from leftover chaff in the fields	August is referred to as 'Vhuvhu', meaning 'windy'. Due to the blustery conditions, stored grain must be winnowed. This month is also associated with Gukurahundi rainfall (see Table 2).
September – "*Gunyana*"		This is the resting month; it is void of expectations as farmers are not expecting rain until mid-October or early November.
October – "*Gumiguru*"		The hot days have persisted since September, with no rain expected until month-end. However, older people look to the moon, saying '*Mwedzi une mvura*' (the moon has water), to predict heavy November rains.
November – "*Mbudzi*"	Summer is also known as "*Zhizha*".	People will be busy with agricultural activities, as this month marks the start of the significant rainfall needed to rejuvenate plant and animal life. They will cultivate the soil and sow seeds.
December (Zvita)		As the October-November crops grow. Communities in Chimanimani continue to receive rainfall during this festive season. Period marked with various farm activities and traditional ceremonies.

Source: Authors

The Ndau community members use the indigenous calendar to anticipate good or bad seasons. Each month is associated with a particular weather pattern. It was noted that the failure of one month to exhibit features associated with it would symbolize a climate change, especially after having witnessed and observed seasons for a very long time. These changes are what convinced most participants that indeed the climate is changing. The interpretation of months to predict weather patterns is not unique to the Ndau people; it is also noted in various communities across Africa, where indigenous populations use traditional knowledge of weather forecasting to guide their agricultural activities (Kaya, 2016). Different observations made by the Ndau people in Chimanimani are useful in predicting changes in the weather and climate of the area.

The community's perceptions of changing weather patterns on the calendar

The participants were able to observe changes in climate and seasons by looking at the type of rain associated with each month of the year, as shown in Table 1. Table 2 highlights the type of rainfall expected throughout the calendar year. The calendar and the rainfall typologies associated with each month were created based on the observations made by the Shona and Ndau indigenous people.

Table 2 Rainfall typologies associated with the Shona/Ndau calendar.

Rainfall Name	Month/s for occurrences	Explanation
"*Mavhurachando*"	May and June	This rainfall marks the start of winter, and most rivers will dry up due to the lack of rain.
"*Gukurahundi*"	August	This early rain is erratic and insufficient to prepare the ground for the new farming season, merely dampening the remaining chaff from harvest.
"*Bumharutsva*"	September and early October	Rain clears burned vegetation after fires, letting new grass grow. But it's not enough to start growing new crops due to the dry land.
"*Bvumiramatondo*"	Mid- October	This rainfall type aids vegetation regrowth, fostering the growth of trees like *Munhondo* and *Musasa* after dry periods.
"*Nhuruka*"	End of October or November	In Chimanimani, heavy rain falls during this time, marking the start of the planting season, which lasts until December.

"Gumbura"	February	Devastating rains received late in the season.
"Tupfunhambuya"	April	This marks the conclusion of a long rainy season, which typically brings rainfall not beneficial for agriculture.

Source: Authors

The local terminology for categorizing rainfall kinds and identifying the corresponding months is a valuable tool for assessing variations in rainfall quantities and patterns throughout the year. It became easier to understand whether there is climate change or not as noted by the interview transcripts that follows. The majority of the key informants (sages) '*ana sekuru/mutape*' the old ones, confirmed seeing some changes in weather patterns and articulation that it was confusing and made it difficult to predict the weather. It was revealed that the '*Nyamavhuvhu*' wind now swept through the area in September instead of August. For instance, participant C1 had this to say, "We used to have '*hukurambuwa*' (rain that removed chaff after harvest) and various other types of rain and we rarely have such". The '*Nyamavhuvhu*' wind is associated with August, an experience that would indicate that the season is going well in its original timeline. Another participant had this to say:

> "*We used to observe reliable rainfall patterns immediately after the winter Chirimo (Summer), such as bumharutsva or mvura yekutanga, followed by Gukurahundi or hukurambuwa. This helped us always gauge the changing seasons accurately and anticipate a good season ahead. now is not the case sometimes we don't receive this rain anymore*" (Participant C2, Male, Transect walks, Ward 15 Chimanimani).

Another participant added:

> "*The timing of land readiness for planting and the planting season's onset has become unpredictable, feeling like a gamble with nature. Historically, rainfall followed a regular pattern: Mavhurachando in June, Gukurahundi in August, Bumharutsva in September, and nhurudza marking the new rainy season. Nowadays, precipitation comes prematurely, belatedly, or inadequately, harming yields. Excess rainfall, like Cyclone Idai, devastates crops and lives. This instability threatens further impoverishment, especially for small-scale farmers reliant on rainfed agriculture.*" (Participant C1, Male, Transect walks, Ward 15 Chimanimani).

One participant concluded:

> "*With regards to the rains, they used to guide us, but since rainfall patterns have changed, we were advised not to rely on them anymore by agricultural extension officers. They advised us to plant our crops during the latest rains. This adjustment has helped us adapt to the changing climate.*" (Talking cycles, Ward 10 Chikukwa).

The documented alterations in these precipitation patterns indicated a shift in the timing of seasons and imposed fresh challenges on farmers' choices for crucial agricultural tasks. The participants were clear that even though the traditional calendar was useful, getting advice from agricultural extension officers was also important. The participants noted that they were changes in climate and weather as they now experience very erratic winds which ordinary people found difficult to understand had become prevalent. The findings are consistent with (Zvobgo *et al.,* 2023; Tirivangasi and Nyahunda, 2024), who observed that most farmers rely on indigenous weather forecasting due to a lack of direct access to scientific weather information. While the reliability of indigenous forecasts has not been fully established, our findings suggest that the Ndau people would benefit from more accurate and timely scientific information to complement their indigenous knowledge, particularly considering the increasingly erratic rainfall patterns associated with climate change.

The community members highlighted the changes in climate as shown by the drying up of streams and rivers during the year as well as the frequency of floods in the area i.e. Cyclone Idai this was not the case before. Further, when asked to establish a timeline of how climate is changing the participants argued that the changes in the rain season were noted by most participants. The climate change is causing the planting season to be reduced. Before the 1970s, the onset of the rainy season typically occurred in either October or November and extended until April, resulting in a six-month period of abundant precipitation that facilitated high-quality agriculture. Between the 1970s and 1980s, the start of the rainy season shifted to November or early December, lasting until March or April (Chanza, 2017). Since the 1980s, the rainy seasons have become exceptionally brief. If rainfall

begins in November or December, it is likely to be substantial and beneficial. However, if the rains start in October, there is a higher probability of experiencing a drought. Unlike before people who grow crops in January would yield a better harvest. These changes were also observed in other studies.
The participants also highlighted that due to the changing weather conditions, the crops they grow also changed. One participant in Machongwe village had this to say:

> "*We used to farm potatoes, sorghum, and millet, which were grown in other parts. However, we later stopped because of the rain. Due to weather changes, we started cultivating maize and engaging in cattle ranching. However, the lack of rain resulted in the burning of our crops, while those who adhered to previous methods achieved high yields*." (Talking Cycles, Ward 15 Chimanimani).

Another participant had this to say:

> "*In the 1990s, we saw a change in the climate: high temperatures, irregular rainfall, droughts, and animal deaths. Crop and livestock pests and diseases rose. Farmers who grew maize starved, but our family survived by cultivating drought-tolerant tiny grains. Elders requested food from their ancestors (mudzimu) during droughts, and floods were unusual*." (Talking cycles, Ward 21 Ngorima).

Another participant noted:

> "*We used to grow millet and sorghum, but due to the hard labour involved in processing these crops, most people have now turned to growing maize. However, due to erratic rains maize is not surviving the weather conditions. In ward 7 there we know one farmer who has stuck to traditional crops, and he had a good harvest. The small grain crops are also known to be highly nutritious, and I think reverting to those is helpful*" (Talking cycles, Nechirinda Ward 18).

The changes in crops grown by community members were solely based on weather observations. These findings were collaborated by (Mapfumo *et al*., 2016) who concur with these observations as other results from other parts of Chimanimani district also indicated that village members rely on farming and conservation agriculture, and they grew drought-resistant and early-maturity crops. In as much as the community members are adjusting to climatic changes, the role of the Ndau indigenous calendar as a seasonal indicator is no longer as reliable as it was. These are indicators that community members relied on to prepare for disasters and new farming seasons. However, observations of fauna and flora as indicators of season or rainfall pattens were found to be very useful and accurate.

The community observations of fauna and flora as indicators of season/ climatic changes in Chimanimani
All the respondents agreed that climate change was taking place. Their justification for this argument ranged from changes in tree and animal behaviour. Most of the participants noted the depletion of fruits that were common as well as the increase in increase in insects, birds, and predators as signs of the changing climate. The second observation of changing climate was observed through the increase in aggressiveness of wildlife and crop raids by wild animals. This behaviour was attributed to the decrease in foodstuff for wild animals in the jungle. These findings were substantiated by other previous studies (Matarira *et al*., 2021; Musakwa *et al.*, 2020; Tirivangasi and Tayengwa, 2017). Some of Chimanimani biological weather forecasting indicators are shown in Table 3.

Table 3. Indigenous knowledge of weather forecasting indicators based on fauna and flora.

Predictors	Description	Weather forecast interpretation
Plants	Flowering of plants	This usually happens in July as an indication that it is now summer
	When there are plenty of wild fruits	It shows that it is going to be a normal rainfall season
	The shedding of leaves by plants	It predicts a dry season

	When indigenous trees like Munhondo (Julbennadia globiflora) and Musasa (Brachystegia spiciformis) begins to bloom.	It indicates that in four weeks or sooner *Nhuruka* (Normal rainfall for planting season) will fall
	Appearance of new trees (ie. Mupesepese)	Indication of changing climate
Animal behaviour	When you start noticing frogs and millipedes	It is officially a rainfall season
	Mbira cries	Rains are less than a week
	Lots of reptiles are present in the area.	It indicates that the summer hot season has begun
	Breeding of goats	Rainfall season is about to begin
Birds	When birds like *Kowero* and *Shezhu* cry	It will rain in less than a week
	Presence of stock birds	Rainfall season is about to begin
	Singing of *Riti*	Rainfall season is about to begin
	Singing and flying of *haya*	Rain shortly
	Guinea fowls laying eggs	Summer season is approaching
	When you notice qualia birds in large numbers everywhere	This indicates that winter has come
	Upon observing swallows soaring at a low altitude	You are going to receive rainfall immediately
Insects	Singing of insects such as *nyenze*	Rain season approaching
	When yellow butterflies choose to appear in the area.	It is an indication of a good rainfall season
	When ants begin to seal off holes	The rain season has just begun, it will rain soon

Source: Authors

As shown in Table 3, the Chimanimani community has a large repertoire of indigenous local weather forecasting that can indicate both short-term and long-term seasonal predictions. These assist in planning whether to stock food or prepare for the new rainfall planting season. These are useful to local indigenous populations who have no access to scientific meteorological data. This table reveals that some of the indicators are unique to the Ndau people, making them inapplicable to other environments or contexts. In order to anticipate changes in the weather, the elderly take note of natural occurrences such as the appearance of particular birds, the mating of particular animals, and the flowering of particular plants. If wild fruits are abundant, then there will likely be a significant amount of rain. During the dry season, the elevation at which birds build their nests is also important. Constructing nests low to the ground will result in unsatisfactory rainfall while building them high up will yield satisfactory rainfall. This validates the Afrocentric claim that people's values, specifically their climate, shape their worldview through their environment. The Ndau have developed an expansive and profound understanding of their environment, which has enabled them to effectively manage their natural resources and become expert farmers. The wide range of different indicators presented demonstrates this. Because these practices can still be described, it is safe to assume that this connection with the natural world has not been severed, despite the effects of colonialism and an educational system modelled after one found in the West that downplays the significance of traditional indigenous knowledge.

Conclusion

This paper investigated the indigenous methods of predicting seasons among rural Ndau people in Zimbabwe and their importance in decision-making, seasonal forecasting, and weather change from an Afrocentric perspective. It addresses a gap in research by examining the Ndau people's calendar and its application in localized weather forecasts for agriculture. The findings show that shifts in rainfall patterns have rendered parts of the calendar less reliable, yet observations of plant and animal behavior remain essential for weather prediction. These indigenous methods play a critical role in strengthening local climate adaptation efforts, particularly in regions like Chimanimani, where communities rely heavily on rain-fed agriculture and natural resources. In Zimbabwe, the findings are relevant to the National Climate Response Strategy and the National Climate Policy, particularly in its thematic area of Weather, Climate Modelling, and Change. Integrating indigenous forecasts into national early warning systems can enhance localized climate risk management and disaster preparedness. The study recommends further research across diverse regions and ethnic groups to build a robust knowledge base, alongside capacity-building initiatives for local leaders, researchers, and educators. Preserving and utilizing indigenous knowledge ensures sustainable and culturally relevant climate adaptation strategies, bridging the gap between traditional wisdom and scientific innovation.

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