



## African Journal of Climate Change and Resource Sustainability

[ajccrs.eanso.org](http://ajccrs.eanso.org)

Volume 4, Issue 1, 2025

Print ISSN: 790-962X | Online ISSN: 790-9638

Title DOI: <https://doi.org/10.37284/2790-9638>



EAST AFRICAN  
NATURE &  
SCIENCE  
ORGANIZATION

Original Article

## Indigenous Knowledge for Climate Change Adaptation and Resilience in Rural Communities of Ankole Sub-region, Uganda

Obadia Mugabirwe<sup>1\*</sup> & Dr. Robert Turyamureeba, PhD<sup>1</sup>

<sup>1</sup> Bishop Stuart University, P. O. Box 09, Mbarara, Uganda.

\* Author for Correspondence Email: [mugabirweobadia@gmail.com](mailto:mugabirweobadia@gmail.com)

Article DOI: <https://doi.org/10.37284/ajccrs.4.1.2925>

### Date Published: ABSTRACT

01 May 2025

#### Keywords:

Indigenous  
Knowledge,  
Climate Change  
Adaptation,  
Climate Change  
Resilience,  
Rural  
Communities,  
Ankole Sub-  
Region,  
Uganda.

As climate change continues to threaten rural livelihoods, indigenous knowledge remains an underutilized resource in adaptation efforts. This study explores how traditional ecological practices and belief systems enhance climate resilience among rural communities in the Ankole sub-region of Uganda. Highlighting the role of indigenous strategies, the research aims to demonstrate how context-specific, culturally embedded solutions can complement formal climate adaptation frameworks. The study employed a qualitative ethnographic approach, using a case study design to examine the application of indigenous knowledge in selected communities, including farmers, women, and youth. The findings reveal that Ankole communities employ a diverse range of indigenous strategies to cope with climate variability and extreme weather events. These include soil and water conservation techniques, traditional water harvesting systems, climate-smart housing designs, and agroforestry practices. The study suggests that integrating indigenous knowledge into formal climate adaptation policies can lead to more sustainable, culturally relevant, and effective solutions. Recognizing and incorporating these time-tested strategies can strengthen resilience at both the local and national levels. This research underscores the significance of indigenous knowledge systems in addressing climate change in rural settings. Bridging the gap between traditional and scientific adaptation approaches highlights the need for holistic and community-driven solutions. The findings contribute to the broader discourse on climate resilience, emphasizing the importance of culturally embedded strategies in shaping sustainable adaptation policies.

### APA CITATION

Mugabirwe, O. & Turyamureeba, R. (2025). Indigenous Knowledge for Climate Change Adaptation and Resilience in Rural Communities of Ankole Sub-region, Uganda. *African Journal of Climate Change and Resource Sustainability*, 4(1), 239-251. <https://doi.org/10.37284/ajccrs.4.1.2925>.

### CHICAGO CITATION

Mugabirwe, Obadia and Robert Turyamureeba. 2025. "Indigenous Knowledge for Climate Change Adaptation and Resilience in Rural Communities of Ankole Sub-region, Uganda", *African Journal of Climate Change and Resource Sustainability* 4 (1), 239-251. <https://doi.org/10.37284/ajccrs.4.1.2925>.

### HARVARD CITATION

Mugabirwe, O. & Turyamureeba, R. (2025) "Indigenous Knowledge for Climate Change Adaptation and Resilience in Rural Communities of Ankole Sub-region, Uganda", *African Journal of Climate Change and Resource Sustainability*, 4(1), pp. 239-251. Doi: 10.37284/ajccrs.4.1.2925.

**IEEE CITATION**

O. Mugabirwe & R Turyamureeba “Indigenous Knowledge for Climate Change Adaptation and Resilience in Rural Communities of Ankole Sub-region, Uganda”, AJCCRS, vol. 4, no. 1, pp. 239-251, May.

**MLA CITATION**

Mugabirwe, Obadia & Robert Turyamureeba. “Indigenous Knowledge for Climate Change Adaptation and Resilience in Rural Communities of Ankole Sub-region, Uganda”. *African Journal of Climate Change and Resource Sustainability*, Vol. 4, no. 1, May. 2025, pp. 239-251, doi:10.37284/ajccrs.4.1.2925.

**INTRODUCTION**

As climate change continues to pose significant challenges worldwide, it is crucial to explore innovative approaches to adaptation and resilience (Datta, 2024). One such approach is harnessing indigenous knowledge, particularly in rural communities of the Ankole Sub-region. By integrating traditional knowledge with scientific knowledge, we can develop a more comprehensive and effective strategy for climate change adaptation and resilience in these communities (Taylor *et al.*, 2023). This integration recognizes the valuable insights and experiences that indigenous communities have accumulated over generations. These communities have developed adaptive coping strategies and possess a deep understanding of their local environment and its changing patterns (Taylor *et al.*, 2023). Combining their knowledge with scientific research, we can create a more holistic and context-specific approach to climate change adaptation (Filho *et al* J. B., 2024). This approach also fosters a sense of ownership and empowerment within these communities, as their knowledge and expertise are recognized and valued (Ansah, & Siaw, 2017) engaging with Indigenous communities and respecting their knowledge systems, we can tap into a wealth of wisdom and local practices that have enabled these communities to thrive in the face of environmental changes for centuries (Makondo, & Thomas, 2018)

In this regard, we think that Indigenous knowledge is just as important as scientific knowledge and the two must be integrated through a multiple evidence-based approach for climate change adaptation and mitigation (Ahearn *et al.*, 2019). Using oral history and available literature, we can examine the traditional knowledge and awareness of climate change and related environmental risks in African traditional society (Zvobgo *et al.*,

2024). Interesting themes emerge from the knowledge holders themselves, revealing a wide range of adaptive coping strategies that have been applied with varying degrees of success (Kalanda *et al.*, 2011). From spotting and reading the position and shape of the ‘new moon’ to rain-making rituals and conservation efforts, traditional African knowledge of environmental change has been passed down for generations, demonstrating its deep-rooted connection to the society itself (Kidemu, 2020). By recognizing and integrating indigenous knowledge into climate change policies and implementation, we can harness the collective wisdom of these communities and enhance their resilience in the face of climate change challenges (Zvobgo *et al.*, 2024).

In the context of climate change, the relevance of indigenous knowledge becomes increasingly clear as it offers valuable perspectives on adapting to environmental changes while maintaining the integrity of ecosystems (Filho *et al* J. B., 2024). Incorporating indigenous knowledge into climate change adaptation strategies, we can build resilience in rural communities by preserving traditional practices that have proven effective over time (Theodory, 2020). This approach not only empowers these communities but also promotes sustainable and holistic solutions to climate change challenges.

The article draws upon the concept of socio-ecological resilience, which emphasizes the interconnected nature of human and natural systems and their ability to adapt to changing environmental conditions (Johan Colding, & Stephan Barthel, 2019). This framework acknowledges the critical role that indigenous knowledge plays in shaping community-based strategies for climate change adaptation and natural resource management. Indigenous knowledge, accumulated through generations of

practical experience and close observation of local ecosystems, offers valuable insights that can complement scientific approaches to environmental problem-solving (Filho *et al.* J. B., 2024). The integration of indigenous knowledge and modern scientific knowledge can lead to the development of more holistic and contextually appropriate solutions for addressing the complex challenges posed by climate change in rural communities (Makondo *et al.*, 2023).

### **Context: Climate Change in Ankole Sub-region**

The Ankole Sub-region of Uganda has historically experienced a tropical climate characterized by distinct wet and dry seasons. Rainfall patterns in the region have been relatively stable, with the majority of precipitation occurring during the two rainy seasons (March-May and September-November) (Uganda National Meteorological Authority, 2024). However, in recent decades, the region has witnessed significant changes in its climatic conditions. According to recent studies, the Ankole Sub-region has experienced a general increase in average temperatures, as well as more pronounced variability in rainfall patterns, the rainy seasons have become less predictable, with some years experiencing delayed onset, reduced duration, or uneven distribution of rainfall. Correspondingly, the dry seasons have become more prolonged and severe (Nanfuka *et al.*, 2020) (Uganda National Meteorological Authority, 2024). These climatic changes have had a direct impact on the agricultural systems and livelihoods of the local communities. Crop yields have become more erratic, and farmers have reported increased incidences of crop failure, livestock mortality, and the emergence of new pests and diseases (Smith, & Johnson, 2024). These climate-induced challenges have exacerbated the vulnerability of rural communities in the Ankole Sub-region, underscoring the urgent need for adaptation strategies that can enhance their resilience.

The Ankole Sub-region, like many other parts of the world, is experiencing the detrimental effects of climate change (Federal Ministry for Economic Cooperation and Development, 2021). Irregular

and unpredictable rainfall patterns, prolonged droughts, and increased severity of extreme weather events such as floods and landslides have become more frequent in recent years. These changes have had a profound impact on the region's agricultural productivity, food security, and overall community resilience (Makondo *et al.*, 2023). Crop failures and declining agricultural yields due to erratic rainfall and prolonged droughts have posed a serious threat to food security in the region (Makondo *et al.*, 2023). This situation has been further exacerbated by the COVID-19 pandemic, which has disrupted food supply chains and restricted access to markets, making it increasingly difficult for the local population to obtain essential food items (Nchanji, & Lutomia, 2021)

Deforestation and unsustainable land management practices have also contributed to soil erosion, land degradation, and loss of biodiversity, further compromising the region's ability to withstand the impacts of climate change (DeFries, 2010). Wetland degradation and the drying up of water sources like the Rwizi River have had severe consequences for communities that rely on these resources for their livelihoods and daily needs (Atwongyeire, 2018). These climate-induced challenges have disproportionately affected the most vulnerable groups within the Ankole Sub-region, including smallholder farmers, pastoralists, and forest-dependent communities (Atwongyeire, 2018). The disruption of traditional food systems and limited access to alternative sources of sustenance have undermined the resilience of these groups, heightening the risk of food insecurity, malnutrition, and poverty (McNamara *et al.*, 2023).

Looking ahead, the projected impacts of climate change in the Ankole Sub-region are expected to exacerbate these challenges, with an increased frequency of extreme weather events, further decline in agricultural productivity, and heightened pressure on natural resources. Moreover, the socio-economic vulnerabilities of the communities are likely to deepen unless proactive measures are taken to address climate change adaptation and resilience (Hosen *et al.*,

2020). Incorporating indigenous knowledge into climate change adaptation strategies is essential for preserving the cultural and ecological integrity of the Ankole Sub-region (Smith, & Johnson, 2024). By recognizing the historical climate patterns and addressing the observed changes, we can pave the way for sustainable and inclusive solutions that embrace the collective wisdom of the indigenous communities (Galappaththi, & Schlingmann A., 2023).

### **Importance of Indigenous Knowledge for Climate Change Adaptation**

Indigenous knowledge plays a crucial role in enhancing climate change adaptation and resilience in rural communities of the Ankole Sub-region. Indigenous knowledge offers valuable insights into traditional agricultural practices, natural resource management, and weather prediction methods that have been refined over centuries of experience. (Oladele, & Amara, 2024) Indigenous groups in the Ankole Sub-region have extensive knowledge about their surrounding environment, including precipitation and temperature patterns, as well as the behaviour of natural ecosystems (Dorji *et al.*, 2024). This expertise empowers them to make informed choices regarding crop planting times, water resource management, and adaptation to changing environmental conditions (Sakapaji, 2022). The Banyankole pastoral community has devised complex strategies for overseeing their herds and grazing lands, incorporating ancestral techniques of rotational grazing, selective breeding, and the conservation of vital plant species for livestock feed (Sakapaji, 2022). Furthermore, the indigenous groups in Ankole have a knack for diversifying their livelihoods by integrating crop farming and animal husbandry. This enhances their resilience to climate-related challenges, as they can rely on multiple sources of income and food security (Amare, & Zerihun, 2018)

Indigenous knowledge involves a comprehensive comprehension of the interrelationships within natural systems, which can guide more sustainable and ecosystem-focused strategies for adapting to climate change. As noted (Makondo, 2018), the

combination of traditional indigenous knowledge and Western scientific expertise has the potential to improve the effectiveness and long-term sustainability of climate change adaptation measures. Integrating traditional wisdom with scientific information and advanced technologies, we have the opportunity to create tailored solutions that are culturally relevant and leverage the strengths of both knowledge systems (Datta, 2024). This is highlighted in (Iloka, 2016), ignoring the importance of understanding the adaptive strategies of local people has led to failed projects in the past. Additionally, indigenous knowledge is often closely tied to the cultural and spiritual beliefs of local communities, which can provide a strong motivational and institutional foundation for climate change adaptation (Iwama, 2021). The Ankole Sub-region is home to various ethnic groups, each with their unique cultural traditions and indigenous knowledge systems. (Ansah, & Siaw, 2017) Harnessing this diversity and incorporating it into climate change adaptation strategies can foster a sense of ownership and empowerment within the local communities, ensuring the long-term sustainability of these interventions (Filho *et al* J. B., 2024)

Indigenous knowledge can function as a storehouse of traditional ecological wisdom, which is crucial for comprehending the intricate connections between human communities and their surrounding ecosystems (Awuah-Nyamekye, 2014). It has been observed that the substantial wealth of indigenous knowledge pertaining to disaster risk reduction and climate change in Africa has not received adequate recognition (Kaganzi *et al.*, 2021). As highlighted in the literature, the integration of indigenous knowledge with scientific approaches can lead to more effective and sustainable climate change adaptation solutions (Legide *et al.*, 2024). Bridging the gap between indigenous knowledge and modern scientific expertise can strengthen community-based adaptation initiatives, enabling rural communities in Ankole to better prepare for and respond to the impacts of climate change



(Zougmore *et al.*, 2023). Research Objectives and Guiding Questions

As climate change increasingly disrupts rural livelihoods, there is a growing need to investigate locally embedded solutions that align with community values, lived experiences, and ecological understanding. In the Ankole Sub-region of Uganda, indigenous knowledge systems offer rich, context-specific practices that have evolved over generations to manage environmental variability. However, these systems are overlooked in formal adaptation strategies. This study aims to fill that gap by systematically exploring the contributions of indigenous knowledge to climate resilience.

### Research Objectives

The overarching aim of this research is to investigate how Indigenous knowledge be harnessed to enhance climate change adaptation and resilience among rural communities in the Ankole Sub-region. This aim is broken down into three specific objectives:

- To explore and document indigenous knowledge systems and practices used by rural communities in the Ankole Sub-region for adapting to climate change.
- To assess the effectiveness and limitations of these traditional strategies in enhancing community resilience to climate variability and environmental stressors.
- To identify opportunities and pathways for integrating indigenous knowledge with modern scientific approaches in climate adaptation policy and practice.

These objectives collectively seek to highlight the practical value, cultural significance, and policy potential of indigenous strategies in addressing the region's pressing climate challenges.

### Guiding Research Questions

In alignment with the study's objectives, the research is guided by the following key questions:

- What indigenous knowledge systems and practices are used by rural communities in the Ankole Sub-region to cope with the impacts of climate change?
- How effective are these indigenous strategies in building resilience to climate-related risks such as droughts, floods, and shifting seasons?
- What mechanisms can support the integration of Indigenous and scientific knowledge systems in climate adaptation planning?

To address these objectives and answer the guiding questions, the study adopts a qualitative ethnographic research approach, utilizing a case study design to explore lived experiences, narratives, and practices within selected rural communities of the Ankole Sub-region. This methodological framework enables a deep engagement with the cultural and environmental contexts in which Indigenous knowledge is acquired and applied.

The following chapter outlines the research design, data collection methods, and analytical strategies employed to capture the richness and relevance of indigenous knowledge systems in climate change adaptation. This study ensured Community participation, ethical considerations, and the triangulation of data sources to ensure reliability and cultural sensitivity.

### METHODOLOGY

This research utilizes a qualitative ethnographic approach to deeply explore the role of indigenous knowledge in enhancing resilience and adapting to climate change within rural communities in the Ankole Sub-region, adopting a case study approach (Aronson, 1995). We interacted with specific communities that have successfully incorporated indigenous knowledge into their strategies for adaptation. Data collection involved conducting semi-structured interviews, facilitating focus group discussions, and analyzing documents. Community elders, traditional leaders, and other influential figures were interviewed using a semi-structured approach to gather their insights, experiences, and viewpoints on the use of

native customs for coping with climate change. Focus group discussions were held with a diverse range of community members, including farmers, women, and youth. The aim was to gain a deeper understanding of collective perspectives, shared practices, and community-level dynamics related to indigenous climate change adaptation. Document analysis involved reviewing relevant government reports, policy documents, academic literature, and community archives to triangulate the data collected from interviews and focus groups.

The study focuses on the Ankole Sub-region in southwestern Uganda, known for its predominantly rural agrarian economy and rich cultural heritage. A purposive sampling technique was used to select three representative communities within the Ankole Sub-region that have effectively integrated indigenous knowledge into climate change adaptation strategies. Each community recruited a diverse sample of participants, including community elders, traditional leaders, farmers, women, and youth, to ensure a comprehensive understanding of the research topic. Upon completing the data collection phase, the next critical step in this study was analyzing the gathered information. The data collected through interviews, focus group discussions, and document analysis was analyzed using thematic analysis. This method involves identifying recurring patterns, ideas, and concepts in the data, which are then grouped into broader thematic categories. Verbatim transcriptions were completed for all interview and focus group recordings before organizing the transcripts with corresponding document information.

## KEY FINDINGS

- Indigenous communities in the Ankole Sub-region use traditional indicators like animal behaviour and plant phenology to forecast weather patterns, which aids in making informed decisions about agriculture and disaster preparedness.
- Indigenous practices such as rotational grazing, selective harvesting, and the protection of forests and wetlands help

maintain biodiversity and ensure sustainable land and resource management.

- Communities employ various coping strategies, including livelihood diversification, food and seed storage, and early warning systems, to manage climate-related risks and adapt to changing conditions.
- Strong social structures, emphasizing collective action and equitable resource sharing, enhance community resilience and adaptive capacity in the face of climate change.
- Combining indigenous knowledge with scientific approaches, such as participatory mapping and collaborative agroforestry, leads to more effective and culturally relevant adaptation strategies.
- Indigenous knowledge is crucial for climate change adaptation in the Ankole Sub-region, yet its integration faces challenges such as generational disconnect, institutional reluctance, and power imbalances.
- An enabling policy environment that recognizes and supports indigenous knowledge is crucial. Engaging with local communities and protecting their intellectual property rights ensures that adaptation measures are relevant, sustainable, and community-driven.

## Indigenous Knowledge Systems in Ankole Sub-region

The Ankole Sub-region of Uganda has a rich cultural heritage, and the local communities have developed a deep understanding of their natural environment over generations. This indigenous knowledge is embedded in traditional practices, customs, and belief systems, which have enabled these communities to adapt to the region's changing climatic conditions (Taremwa *et al.*, 2016; Makondo, 2018). The research identified several key indigenous knowledge systems that rural communities in the Ankole Sub-region have long utilized to adapt to climate variability and change: Elders and traditional leaders in the

communities possess a deep understanding of environmental indicators, such as the behaviours of certain plants and animals, cloud formations, and wind patterns, which they use to predict upcoming weather patterns and extreme events (Sakapaji, 2022). One elder noted, *"We have observed that when the Rwakikyera tree starts flowering earlier than usual, it is a sign that the rainy season will come late that year."*

Farmers in the region have developed indigenous techniques for crop selection, planting timing, and livestock rearing that are adapted to the local climate and environmental conditions. For example, they cultivate drought-resistant crop varieties and practice rotational grazing to conserve pasture land (Ansah, & Siaw, 2017). One farmer explained, *"We choose to grow Matooke and Millet because they are more resilient to the changing rainfall patterns we have been experiencing."* Communities have traditional methods of water harvesting, storage, and distribution that maximize the use of limited water resources during periods of erratic rainfall and drought (Sakapaji, 2022). As noted by a community elder, *"Our ancestors built intricate systems of Ebisharara (swamps) to capture and store water from springs and streams for use during the dry season."*

Respondents described how they maintain the diversity of indigenous plant and animal species, which provide essential resources and act as natural buffers against climate-related stresses (Legide *et al.*, 2024). This is achieved through the observance of taboos, cultural rituals, and customary rules governing resource extraction and land use (Mavhura, & Mushure, 2019). As cited by a youth representative, *"We have always been taught to only take what we need from the forest and to leave enough for the wildlife and future generations."* These examples illustrate the depth and breadth of indigenous knowledge systems that rural communities in the Ankole Sub-region have developed over generations to cope with climatic variability (Habiyaemye, & Korina, 2021).

### Challenges and Enablers

Despite the demonstrated value of indigenous knowledge for climate change adaptation, the research identified several challenges to its effective integration: Younger generations are increasingly disconnected from traditional ecological knowledge due to the erosion of cultural practices and rapid socio-economic changes. Strategies are needed to revitalize indigenous knowledge transmission within communities (Dorji *et al.*, 2024). As observed by a youth participant, *"Many of us don't know the traditional ways of our ancestors because we spend more time in school and with modern technology."* Formal institutions, such as government agencies and research organizations, often lack the capacity, resources, and willingness to meaningfully engage with indigenous knowledge systems.

This can hamper efforts to integrate them into climate change adaptation planning and programming (Zougmore *et al.*, 2023). This is emphasized in the words of a local leader, *"The district officials seem to think our traditional ways are backward and that we need to modernize."* Indigenous communities frequently face marginalization and unequal power dynamics in relation to dominant scientific and political institutions (Dean MRU, 2023). This can undermine the recognition and integration of their knowledge and practices. As cited, *"National-level governance structures typically include passing mention of the importance of preserving indigenous rights and knowledge but are largely dominated by strategies that render climate adaptation a series of technical and economic challenges."* (Nalau *et al.*, 2018). This can undermine their ability to assert legitimacy and relevance.

Despite these challenges, the research also identified several enabling factors that can facilitate the integration of indigenous and scientific knowledge for climate change adaptation: As mentioned earlier, the adoption of participatory methodologies that actively involve communities in adaptation interventions is crucial for elevating the status of indigenous knowledge (Taylor *et al.*, 2023). As emphasized by a

researcher, *"By creating spaces for dialogue and co-learning, we can build mutual understanding and trust between communities and other stakeholders."* Efforts to revitalize and empower traditional governance structures, such as cultural councils and elders' forums, can enhance the ability of indigenous communities to assert their knowledge and influence adaptation planning. (Marrengane *et al.*, 2021). As noted by a community elder, *"When the project team came and consulted with our traditional leaders, we felt that our voices were being heard and respected."*

The systematic documentation and scientific validation of indigenous practices can increase their credibility and acceptance within formal institutions (Zvobgo *et al.*, 2024). This can be achieved through collaborative research between communities and external experts as highlighted by a researcher, *"By working together to understand the mechanisms and effectiveness of indigenous practices, we can build a stronger case for their integration into adaptation strategies."* The research highlights the immense value of indigenous knowledge systems for enhancing climate change adaptation and resilience in the rural communities of the Ankole Sub-region. By integrating these knowledge systems with scientific approaches through collaborative and participatory processes, policymakers and practitioners can develop more effective, culturally appropriate, and sustainable adaptation strategies (Legide *et al.*, 2024). Overcoming the challenges to this integration, such as intergenerational knowledge loss and institutional barriers, will be crucial to realizing the full potential of indigenous knowledge for climate change adaptation in the region (Datta, 2024).

### **Contributions of Indigenous Knowledge to Climate Change Adaptation**

The study findings reveal several ways in which indigenous knowledge contributes to climate change adaptation in the Ankole Sub-region: Respondents described how they use traditional indicators, such as animal behaviour, plant phenology, and celestial patterns, to observe environmental changes and predict weather

patterns (Makondo, 2018). This allows them to make more informed decisions about agricultural activities, resource management, and disaster preparedness (Kaganzi *et al.*, 2021). As explained by a farmer, *"We know when to plant our crops and when to harvest based on the signs in nature that our ancestors have taught us."*

Indigenous communities have developed sophisticated systems for the sustainable use and conservation of land, water, and biological resources. These include practices such as: - Rotational grazing and fallowing to maintain soil fertility (Legide *et al.*, 2024), Selective harvesting of plant species to ensure regeneration (Makondo, 2018)- Protecting sacred forests and wetlands as ecological refugia - Integrated management of crop, livestock, and forest systems (Makate, 2020). As stated by a community leader, *"Our traditional ways of using the land and resources have allowed us to thrive for generations without destroying our environment"*. Interviewees discussed how their communities employ various indigenous strategies to mitigate and cope with climate-related risks, such as: - Diversifying livelihood activities -Storing and preserving food and seeds for periods of scarcity -Utilizing indigenous early warning systems to prepare for extreme events (Chen, & Cheng, 2020) Relying on social safety nets and reciprocal exchange systems (Filho *et al.* J. B., 2024). As explained by a community member, *"When the rains fail, we know which wild foods to gather and how to preserve our harvests to get us through the tough times"*.

Indigenous knowledge is embedded within a broader socio-cultural context that emphasizes collective action, reciprocity, and the equitable sharing of resources (Dean MRU, 2023). These social structures and cultural values can enhance the adaptive capacity of communities in the face of climate change (Dorji *et al.*, 2024). As noted by a local leader, *"Our sense of community and shared responsibility is what has allowed us to survive and thrive in this harsh environment for centuries"*. The research findings show the diverse ways in which indigenous knowledge can enhance culturally appropriate and sustainable climate



change adaptation in the Ankole Sub-region. By integrating these knowledge systems into adaptation policies and programs, local communities can strengthen capabilities and existing adaptive capacities (Iwama, 2021).

### **Integrating Indigenous and Scientific Knowledge**

Indigenous knowledge offers valuable insights and strategies for climate adaptation, but it should not be viewed in isolation. As noted: *"Combining different knowledge systems is potentially one of the surest ways to successful adaptation"* (Makondo, 2018). There is a need to intentionally bridge indigenous knowledge with scientific approaches to generate holistic, community-owned solutions (Legide *et al.*, 2024). One respondent emphasized: *"Our traditional ways have helped us survive for generations, but now the climate is changing so quickly. We need to work with experts to find new ways to adapt."*

Participatory mapping of community resources, hazards, and vulnerabilities, drawing on both local spatial knowledge and scientific data, to inform adaptation planning (Dean MRU, 2023). Co-development of early warning systems that combine indigenous forecasting methods (e.g., observation of plant and animal behaviour) with scientific weather monitoring and modelling (Filho *et al.* J. B., 2024). Collaborative agroforestry initiatives that integrate local tree species, planting techniques, and land management practices with improved crop varieties and sustainable farming methods. Joint natural resource management arrangements that leverage community-based institutions and customary norms alongside technical expertise in sustainable land use and ecosystem-based adaptation (Makate, 2020). This is observed: *"When the elders work together with the agricultural extension officers, we can find ways to use our land more sustainably even as the climate changes"*.

Such approaches not only capitalize on the complementarity of different knowledge systems but also promote community ownership, social learning, and sustained adaptation (Iwama, 2021).

Crucially, the process of knowledge integration should be equitable, inclusive, and responsive to the priorities and worldviews of local communities (Galappaththi, & Schlingmann A., 2023). Ultimately, harnessing the synergies between indigenous knowledge and scientific expertise can lead to more holistic, contextually relevant, and effective strategies for strengthening the climate resilience of rural communities in the Ankole Sub-region (Dorji *et al.*, 2024). Effectively harnessing the potential of these knowledge systems requires intentional integration with scientific and technological advancements (Zvobgo *et al.*, 2024). For example, traditional forecasting methods can be combined with modern meteorological data to improve the accuracy and reliability of climate information (Taylor *et al.*, 2023). It also involves integrating indigenous resource management practices with scientific sustainability principles and ecosystem-based approaches for adaptation (Datta, 2024). Drawing on the complementary strengths of different knowledge systems, adaptation interventions can be more comprehensive, culturally specific, and effective in building the resilience of rural communities in the Ankole Sub-region.

### **CONCLUSION**

This research highlights the crucial role of indigenous knowledge in enhancing climate change adaptation and resilience within rural communities of the Ankole Sub-region. The findings underscore the wealth of traditional ecological knowledge, resource management techniques, and early warning systems that have been developed and refined by indigenous communities over many years. These context-specific forms of knowledge offer valuable insights for understanding and mitigating the impacts of climate change.

However, the study also emphasizes that indigenous knowledge should not be viewed in isolation, but rather as part of a broader, integrated approach to climate adaptation. The effective harnessing of indigenous knowledge requires a

deliberate process of bridging it with scientific and technological advancements.

The study highlights the importance of policymakers, development agencies, and practitioners recognizing the valuable role of indigenous knowledge in building resilience to climate change. By integrating traditional governance structures, promoting intergenerational knowledge exchange, and encouraging collaborative approaches to adaptation, rural communities can significantly enhance their resilience.

### Implications for Policy and Practice

Combining indigenous and scientific knowledge in the Ankole Sub-region yields findings with important implications for policy and implementation. It is crucial that policymakers, development agencies, and practitioners recognize the valuable contribution of indigenous knowledge in their efforts to build climate resilience.

Promoting mutual learning and cooperation between indigenous communities and scientific organizations is essential. This can be achieved by creating forums for discussion, sharing of knowledge, and jointly developing climate information. Building respectful partnerships that incorporate both types of knowledge enables the formulation of more resilient adaptation strategies tailored to specific contexts.

Furthermore, policy frameworks and development interventions should prioritize the preservation and revitalization of traditional resource management systems. This involves recognizing the socio-cultural context and governance structures that support indigenous practices. By integrating these systems into wider climate resilience initiatives, there is a greater potential to enhance the adaptive capacity of communities and ensure the long-term sustainability of natural resources.

Investing in education and programs to develop skills that acknowledge and appreciate indigenous knowledge is crucial. Empowering local communities to record, protect, and pass down

their traditional knowledge to the younger generation can help uphold these important customs and ensure their ongoing significance amidst environmental shifts.

In summary, the Ankole Sub-region must effectively combine traditional and scientific knowledge to overcome the obstacles presented by climate change. Recognizing the valuable input from both systems and promoting cooperation can help policymakers and practitioners create a more resilient and sustainable environment in response to climate variability and extreme events.

### Recommendations for Future Research

This research has shed light on the importance of integrating indigenous knowledge into climate change adaptation strategies within the Ankole Sub-region. However, there are several areas that merit further investigation:

- Detailed case studies of successful integration of indigenous and scientific knowledge in climate change adaptation projects, highlighting best practices and key enabling factors.
- Comparative analysis of adaptation strategies and outcomes across different ethnic groups and communities within the Ankole Sub-region to uncover nuances in traditional knowledge and practices.
- Longitudinal studies to monitor the long-term sustainability and efficacy of adaptation interventions that combine indigenous and scientific approaches.
- Conduct in-depth ethnographic studies to document the nuanced traditional ecological knowledge and resource management practices of indigenous communities in the Ankole Sub-region.
- Explore the gender dimensions of indigenous knowledge and climate adaptation to understand how women's traditional roles and knowledge can contribute to community resilience.

- Investigate the potential of establishing knowledge-sharing platforms and co-production frameworks that bridge indigenous and scientific knowledge for climate change adaptation.
- Analyze the institutional and policy environments required to effectively integrate indigenous knowledge into climate change adaptation planning and implementation.
- Expand the geographic scope of the study to include other sub-regions in Southwestern Uganda to gain a more comprehensive understanding of regional Indigenous knowledge systems and their climate resilience potential.
- Pursuing these research directions, we can deepen our understanding of the nuances of traditional ecological knowledge, uncover innovative adaptation strategies, and develop more inclusive, holistic, and sustainable responses to the climate crisis in the Ankole Sub-region.

## REFERENCES

- Ahearn et al, O. M. (2019). Indigenous Peoples and Climate Change: Emerging Research on Traditional Knowledge and Livelihoods. *International Labour Organization*, ISBN: 978-92-2-132935-0.
- Amare, Z. Y. (2018). Indigenous knowledge of rural communities for combating climate change impacts in west central Ethiopia. *Journal of Agricultural Extension*, 22(1), 181-195.
- Ansah, G. O., & Siaw, L. P. (2017). Indigenous knowledge: Sources, potency and practices to climate adaptation in the small-scale farming sector. *Journal of Earth Science and Climate Change*, 8(12).
- Aronson, J. (1995). A Pragmatic View of Thematic Analysis. *The Qualitative Report*, 2(1), 1-3.
- Atwongyeire, D. (2018). Land Use Practices in the Rural and Urban Sub Catchments of River Rwizi, Western-Uganda; Their Effect on Its Ecological Characteristics. *International Journal of Energy and Environmental Science*, 3(2).
- Awuah-Nyamekye, S. (. (2014). Indigenous Ways of Creating Environmental Awareness: Case Study from Berekum Traditional Area of Ghana. *Journal for the Study of Religion Nature and Culture*, 8(1):46-63.
- Chen, T. L., & Cheng, H. W. (2020). Applying traditional knowledge to resilience in coastal rural villages. *International Journal of Disaster Risk Reduction*, 47, 101564.
- Datta, R., & Kairy, B. (2024). Decolonizing climate change adaptations from Indigenous perspectives: Learning reflections from Munda Indigenous communities, coastal areas in Bangladesh. *Sustainability*, 16(2), 769.
- Dean, M. R. U. (2023). Indigenous knowledge for social cohesion, ecological and community well-being, and climate resilience: reviving Indigenous salt crafting in Vusama, Fiji. *AlterNative: An International Journal of Indigenous Peoples*, 19(3), 711-724.
- Defries, R., & Rosenzweig, C. (2010). Toward a whole-landscape approach for sustainable land use in the tropics. *Proceedings of the National Academy of Sciences*, 107(46), 19627-19632.
- Dorji, T., Morrison-Saunders, A., & Blake, D. (2023). Understanding how community wellbeing is affected by climate change: evidence from a systematic literature review. *Environmental Management*, 72(3), 568-586.
- Federal Ministry for Economic Cooperation and Development. (2021). Climate Risk Profile: Uganda. *Federal Ministry for Economic Cooperation and Development*.
- Galappaththi, E. K., & Schlingmann, A. (2023). The sustainability assessment of Indigenous and local knowledge-based climate adaptation responses in agricultural and aquatic food

- systems. *Current Opinion in Environmental Sustainability*, 62, 101276.
- Habiyaremye, A., & Korina, L. (2021). Indigenous knowledge systems in ecological pest control and post-harvest rice conservation techniques: sustainability lessons from Baduy communities. *Sustainability*, 13(16), 9148.
- Hosen, N., Nakamura, H., & Hamzah, A. (2020). Adaptation to climate change: Does traditional ecological knowledge hold the key?. *Sustainability*, 12(2), 676.
- Iloka, N. (2016). Indigenous knowledge for disaster risk reduction: An African perspective. *Jàmbá: Journal of Disaster Risk Studies*, Vol 8, No 1 | a272.
- Iwama, A. Y., Araos, F., Anbleyth-Evans, J., Marchezini, V., Ruiz-Luna, A., Ther-Ríos, F., ... & Perkins, P. E. (2021). Multiple knowledge systems and participatory actions in slow-onset effects of climate change: insights and perspectives in Latin America and the Caribbean. *Current Opinion in Environmental Sustainability*, 50, 31-42.
- Colding, J., & Barthel, S. (2019). Exploring the social-ecological systems discourse 20 years later. *Ecology and Society*, 24(1).
- Kaganzi, K. R., Cuni-Sanchez, A., Mcharazo, F., Martin, E. H., Marchant, R. A., & Thorn, J. P. (2021). Local perceptions of climate change and adaptation responses from two mountain regions in Tanzania. *Land*, 10(10), 999.
- Kalanda-Joshua, M., Ngongondo, C., Chipeta, L., & Mpembeka, F. (2011). Integrating indigenous knowledge with conventional science: Enhancing localised climate and weather forecasts in Nessa, Mulanje, Malawi. *Physics and Chemistry of the Earth, Parts a/b/c*, 36(14-15), 996-1003.
- Kidemu, M. G. (2020). Traditional Ecological Knowledge for Climate Change Assessment and Rainfall Prediction: A Case of Adami Tulu Jido Kombolcha District, Oromia Region, Ethiopia. *International Journal of Natural Resource Ecology and Management*, 5(2):43.
- Legide, Y. Y., Feyissa, G. S., & Karo, T. M. (2024). Revitalizing indigenous practices employed by farmers to reduce agriculture's vulnerability to climate change: a systematic review. *Journal of Environmental Studies and Sciences*, 14(2), 400-414.
- Leal Filho, W., Barbir, J., Gwenzi, J., Ayal, D., Simpson, N. P., Adeleke, L., ... & Yaffa, S. (2022). The role of indigenous knowledge in climate change adaptation in Africa. *Environmental Science & Policy*, 136, 250-260.
- Makate, C. (2020). Local institutions and indigenous knowledge in adoption and scaling of climate-smart agricultural innovations among sub-Saharan smallholder farmers. *International Journal of Climate Change Strategies and Management*, 270-287.
- Makondo, C. C., & Thomas, D. S. (2018). Climate change adaptation: Linking indigenous knowledge with Western science for effective adaptation. *Environmental science & policy*, 88, 83-91.
- Makondo, C. C., & Thomas, D. S. (2018). Climate change adaptation: Linking indigenous knowledge with Western science for effective adaptation. *Environmental science & policy*, 88, 83-91.
- Makondo, C. C., Chola, K., & Moonga, B. (2014). Climate change adaptation and vulnerability: A case of rain-dependent small-holder farmers in selected districts in Zambia. *American Journal of Climate Change*, 3(4), 388-403.
- Marrengane, N., Sawyer, L., & Tevera, D. (2021). Traditional authorities in African cities: Setting the scene. *African Studies*, 80(2), 125-133.
- Clissold, R., McNamara, K. E., Westoby, R., & Wichman, V. (2023). Experiencing and responding to extreme weather: lessons from



- the Cook Islands. *Local Environment*, 28(5), 645-661.
- Nalau, J., Becken, S., Schliephack, J., Parsons, M., Brown, C., & Mackey, B. (2018). The role of indigenous and traditional knowledge in ecosystem-based adaptation: A review of the literature and case studies from the Pacific Islands. *Weather, Climate, and Society*, 10(4), 851-865.
- Nanfuka, S., Mfitumukiza, D., & Egeru, A. (2020). Determinants of ecosystem-based adaptation to drought in the central cattle corridor of Uganda.
- Nchanji, E. B., & Lutomia, C. K. (2021). Regional impact of COVID-19 on the production and food security of common bean smallholder farmers in Sub-Saharan Africa: Implication for SDG's. *Global Food Security*, 29, 100524
- Sakapaji, S. C. (2022). Integrating Local and Indigenous Ecological Knowledge (IEK) Systems into Climate Change Policies for Resilience Building, and Sustainability in Agriculture 'A Case Study of Barisal Southern Bangladesh. *IAR Journal of Agricultural Science and Food Research*, 2(1), None-None.
- Taremwa, N. K., Gashumba, D., Butera, A., & Ranganathan, T. (2016). Climate change adaptation in Rwanda through indigenous knowledge practice. *Journal of Social Sciences*, 46(2), 165-175.
- Taylor, J. E., Poleacovski, C., & Perez, M. A. (2023). Climate change adaptation trends among Indigenous peoples: a systematic review of the empirical research focus over the last 2 decades. *Mitigation and Adaptation Strategies for Global Change*, 28(6), 29.
- Theodory, T. F. (2020). Understanding the relevance of indigenous knowledge on climate change adaptation among mixed farmers in the Ngono River Basin, Tanzania. *African Journal of Science Technology Innovation and Development*, 13(1):1-9.
- Uganda National Meteorological Authority. (2024). Seasonal forecast. *Online*.
- Zougmore, R., Segnon, A. C., & Thornton, P. (2023). Harnessing indigenous knowledge and practices for effective adaptation in the Sahel. *Current Opinion in Environmental Sustainability*, 65, 101389.
- Zvobgo, L., Johnston, P., Williams, P. A., Trisos, C. H., Simpson, N. P., & Global Adaptation Mapping Initiative Team. (2022). The role of indigenous knowledge and local knowledge in water sector adaptation to climate change in Africa: a structured assessment. *Sustainability Science*, 17(5), 2077-2092.