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Bridging Local and Traditional Knowledge Systems with Digital Technologies for Climate Resilience in Kenya.

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Executive Summary

Local and Traditional weather and ecological knowledge remains an important source of climate information for farming communities in Kenya's drylands. Research undertaken in Kitui and Taita Taveta counties found that Indigenous forecasting systems continue to inform agricultural planning and climate adaptation decisions. Communities routinely combine observations of Indigenous indicators with scientific weather forecasts, highlighting significant opportunities for complementary approaches to climate services, especially in the context of digital technologies.

Despite their continued relevance, Local and Traditional Knowledge systems (LTK) face growing threats from climate change, ecological change, weakening systems of intergenerational transmission, and limited institutional support. This brief presents evidence from the study and identifies priority actions to safeguard, strengthen, and integrate LTK into agricultural resilience and climate adaptation efforts through climate services.

Introduction

Climate change is increasing the frequency and severity of droughts and flooding across Kenya's arid and semi-arid regions. Reliable and locally relevant climate information has become increasingly important for supporting agricultural production, food security, and climate adaptation and resilience.

Alongside scientific forecasting systems, communities in Kitui and Taita Taveta continue to rely on local observations of weather and ecological knowledge developed through long-term, generational observation of local environments. These systems draw on observations of plant phenology, animal and bird behaviour, insect activity, cloud formations, winds, stars, and moon phases to interpret seasonal conditions and guide livelihood decisions.

Although Local and Traditional Knowledge is increasingly recognised within climate adaptation and disaster risk reduction discussions, the research found that practical integration into policy, planning, extension services, and climate information systems remains limited.



Leafcutter ants carry pieces of leaves back to their colony, showcasing the intricate relationships between insects and their environment. In local and traditional knowledge systems, observing insect behaviour can provide communities with clues about changing weather patterns and help inform seasonal planning for farming and climate resilience.

Evidence and Analysis

Finding 1: Indigenous Forecasting Remains Widely Used

The research documented extensive use of Indigenous weather forecasting systems intertwined with cultural norms and practices across both study sites. Communities use observations of:

Table 1: Examples of Community-based climate indicators

Type	Theme	Indicator	Interpretation	Action
Biophysical	Animals	Frogs croaking	Heavy rains are imminent	Prepare fields; dig water trenches
	Insects	White butterflies	Rains will begin within weeks	Begin planting short-cycle crops
	Plants	Baobab flowering	Start of reliable rainy season	Prepare land; apply manure; seed beds
		Sandwort blooming	Strong rains expected soon	Plant maize or sorghum
Meteorological	Wind/Dew	Heavy dew, wind shift	Weather change or rain onset imminent	Transition livestock; adjust food storage
Sacred	Rituals	Rainmaking ceremony	Rain delay due to spiritual imbalance	Conduct ritual and cleansing ceremony
	Celestial	Dark crescent moon	Timing of seasonal transition	Initiate rain prayers or ceremony alignment
Combined		Frogs + butterflies + sounds	Multiple signs confirm rain is near	Prepare seed/tools; confirm planting window

These indicators continue to inform decisions relating to planting, livestock management, and resource planning.

Finding 2: Communities Already Use Multiple Knowledge Sources

The evidence suggests that Indigenous and scientific forecasting systems are already being used in complementary ways at community level. Participants consistently reported combining Indigenous indicators with information obtained from: Kenya Meteorological Department forecasts; Radio broadcasts; Mobile phones; Agricultural extension services; Participatory climate information processes.

Finding 3: Climate Change is Challenging Existing Local and Traditional Knowledge Systems

Participants reported increasing uncertainty regarding some traditional indicators. Changes in ecological conditions have altered the timing and behaviour of indicators that were previously considered reliable. Communities are adapting their interpretation of these signals but acknowledge growing uncertainty.

Finding 4: Knowledge Transmission Systems are Weakening

Across both counties, participants highlighted declining opportunities for younger generations to learn from elders. Formal education, migration, changing livelihoods, and changing social and religious norms have disrupted traditional pathways of knowledge transmission.

Finding 5: Stakeholders Support Stronger Integration

Community members, agricultural officers, NGOs, NDMA representatives, and KMD staff identified opportunities for stronger collaboration between local and scientific forecasting systems. Participatory Scenario Planning demonstrates that local knowledge can already be integrated with meteorological information, but these processes can depend on project support and remain uneven. The opportunity is to build on these existing practices through more sustained integration across locations and seasons.

Policy Recommendations

Document and Safeguard Local and Traditional Weather Knowledge

Enable community-led documentation and verification of locally selected weather indicators, forecasting practices and seasonal calendars, while retaining their context, interpretation and community ownership.

- Support systematic recording of locally relevant indicators.
- Ensure knowledge is documented in ways that preserve its environmental and cultural context
- Use repeated observations to assess how indicators perform and change over time.

Strengthen Knowledge Transmission

Integrate Local and Traditional Knowledge (LTK) into education, extension and climate-literacy initiatives.

- Education and changing livelihoods are contributing to declining knowledge transmission.
- Youth engagement with LTK has decreased.
- Create greater opportunities for intergenerational learning and knowledge exchange.

Support Hybrid Forecasting Approaches

Strengthen approaches that combine local indicators with scientific forecasts.

- Communities already draw on multiple sources of climate information.
- Participatory forecasting provides an existing basis for collaborative interpretation and verification.
- Support community-led recording across multiple seasonal cycles to assess how the timing, interpretation and reliability of indicators change over time and compare with scientific forecasts.

Invest in Community-Based Knowledge Systems

Support local knowledge-sharing and observation networks.

- Local forecasting relies on collective observation and interpretation.
- Community dialogue provides an important mechanism for interpreting and validating observations.
- Strengthen local networks that support continued knowledge exchange.

Embed LTK in Climate Services

Integrate LTK into climate adaptation, agriculture and disaster-risk management, building on participatory seasonal planning processes that already bring local observations and meteorological information together.

- There remains a gap between policy recognition and consistent practical application.
- Integration can remain dependent on project support and therefore uneven across locations.
- Strengthen existing participatory approaches rather than creating parallel mechanisms.

Support Long-Term Knowledge Continuity

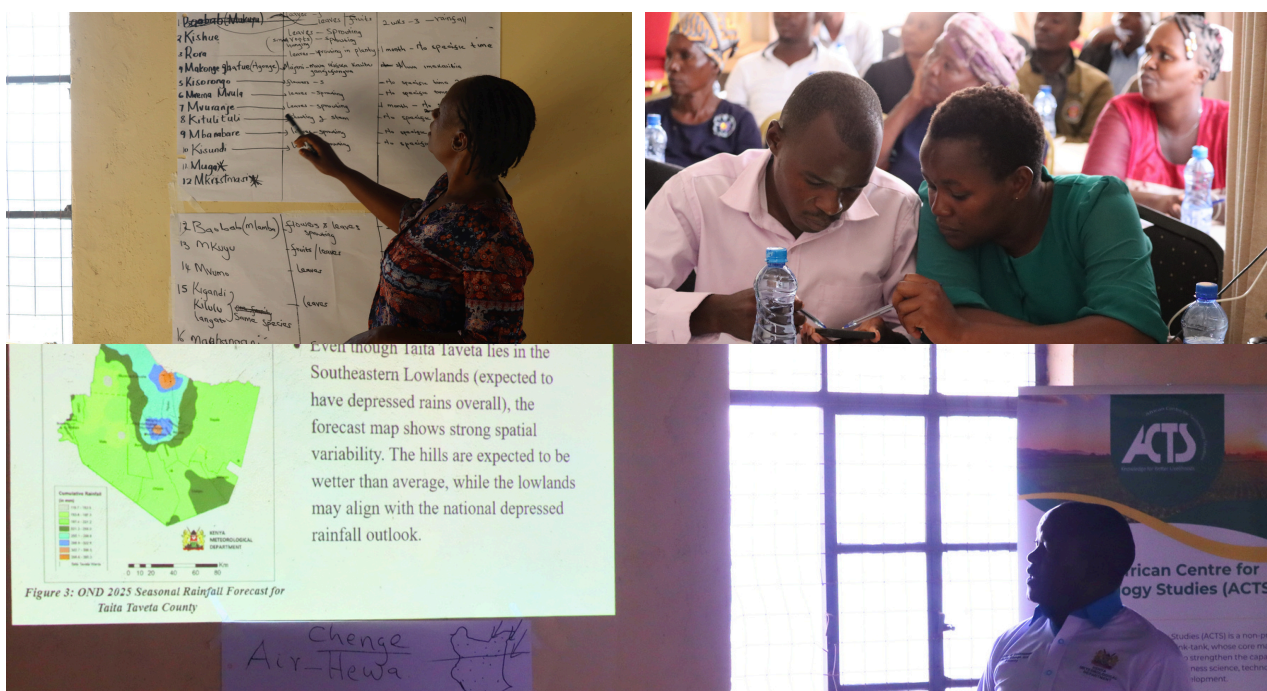
Invest in sustained mechanisms for intergenerational knowledge transfer.

- Short-term initiatives cannot address the longer-term erosion of knowledge.
- Continuity is important for keeping LTK relevant and adaptive as environmental conditions change.
- Knowledge transmission should remain an ongoing community process rather than a one-off intervention.

Use Digital Technologies to Support Implementation

Where they respond to identified needs, digital technologies, including community-based platforms and potentially digital twins, could support the recommendations above by documenting observations, retaining contextual and seasonal information, and supporting comparison with scientific climate information.

- Build longitudinal records that enable locally selected indicators, meteorological forecasts and subsequent seasonal conditions to be compared over time.
- Use digital approaches to support, rather than replace, existing knowledge and participatory processes.
- Ensure community control and appropriate governance over how knowledge is recorded, accessed and reused.

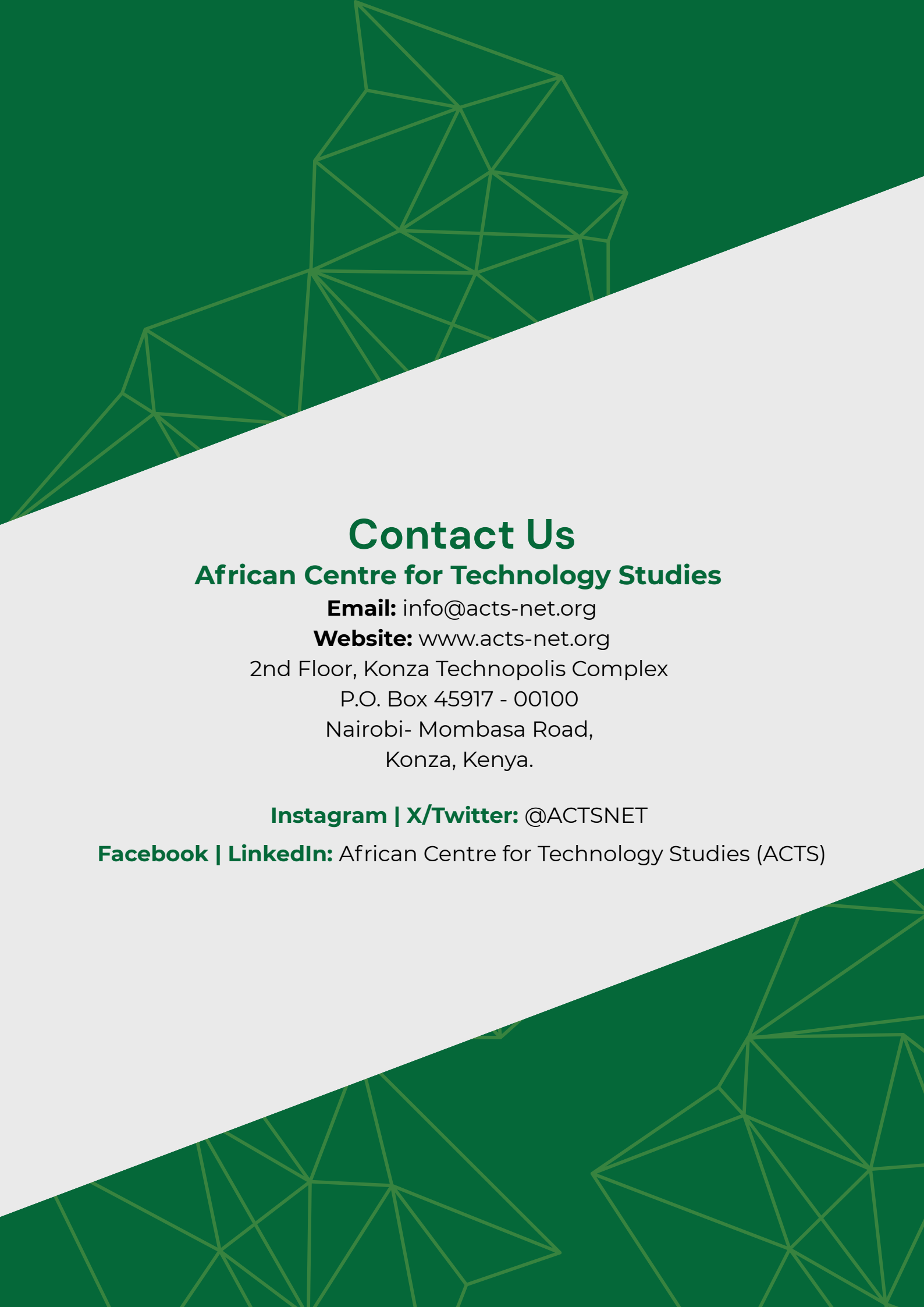


Stakeholders in Taita Taveta County discuss climate forecasting and local and traditional knowledge during a stakeholder meeting and focus group discussion. Mr Geoffrey Mwongela, Meteorologist at the Kenya Meteorological Department (KMD), presents the October–December rainfall outlook, while community participants share insights into plant behaviour and seasonal indicators that help farmers and communities anticipate weather changes and make informed agricultural decisions. © Patience Mebo/ACTS

Conclusion

The evidence from Kitui and Taita Taveta demonstrates that Local and Traditional Knowledge continues to play an important role in agricultural decision-making and climate adaptation. At the same time, climate change, social change, and uneven institutional support are placing this knowledge under increasing pressure. Policymakers should therefore focus on safeguarding Local and Traditional Knowledge, supporting its transmission, strengthening sustained integration with scientific climate information systems, and enabling community-led observation and validation across multiple seasonal cycles. Digital technologies, potentially including digital twins, can support these recommendations where they respond to demonstrated needs, strengthen rather than replace existing participatory processes, and preserve community context and governance.

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