



Analysing the Indigenous knowledge contributing to the survival of pastoralists in northern Kenya's dry areas

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Abstract

Pastoralists in Northern Kenya have relied on indigenous knowledge for centuries to endure natural disasters such as droughts, famine, floods, and diseases. This study aimed to examine the types of indigenous knowledge applied by livestock keepers in Northern Kenya and how these practices are influenced by climate variability. Guided by resilience theory, data were collected through secondary sources, semi-structured interviews, focus group discussions, and direct observation. The findings reveal that indigenous knowledge is crucial for survival in Kenya's dry areas including a deep understanding of local ecology, facilitating migration to greener pastures during droughts. Pastoralists select livestock species based on their adaptability to specific ecological conditions, enhancing survival rates. Indigenous knowledge is crucial for survival in Kenya's dry areas, encompassing a deep understanding of local ecology and facilitating migration to greener pastures during droughts. Pastoralists select livestock species based on their adaptability to specific ecological conditions, enhancing survival rates—Indigenous weather forecasting methods guide movement, showcasing the effectiveness of traditional knowledge in anticipating environmental changes. Additionally, pastoralists possess extensive knowledge of wild edible plants used for food during drought and employ indigenous food preservation techniques, contributing to food security and sustenance. These findings highlight the critical role of traditional knowledge systems in enhancing adaptive capacity and sustaining livelihoods during calamities. However, the efficacy of indigenous knowledge is eroding due to increasing climate and socio-economic challenges, emphasising the need for sustainable interventions. Integrating Indigenous knowledge into formal policies, conserving biodiversity, and promoting hybrid approaches combining Indigenous knowledge with modern technologies is crucial. Capacity-building, financing for herd restocking, and biodiversity conservation are necessary to safeguard livelihoods amid climatic and socio-economic changes.

Introduction

Pastoralism is a critical economic and cultural practice, particularly in arid and semi-arid lands (ASAL), sustaining millions of livelihoods globally (Wafula et al., 2022). In Kenya, ASALs constitute over 80% of the country, supporting 70% of the livestock and 36% of the human population (KNBS, 2019). These regions experience limited rainfall—arid areas receive 150–550 mm and semi-arid areas 550–850 mm annually (Schilling and Werland, 2023). Kenya's ASAL counties have faced increasing drought frequency, with inter-drought periods shortening from 5–10 years to 2–3 years (Nyaoro et al., 2016).

Erratic rainfall and growing aridity exacerbate the vulnerability of pastoralist communities, which rely heavily on mobile livestock production. Additionally, severe El Niño floods in 1961-62, 1997-98, and 2023-24 have caused widespread loss of life, displacement, and property destruction. Despite these extreme climatic conditions, pastoralist communities have thrived in these environments over generations by relying on indigenous knowledge systems and practices. Conventional modern technologies and interventions have not effectively mitigated these challenges, but indigenous knowledge has played a crucial role in resilience and survival. However, there is limited documentation and integration of this knowledge into current adaptation strategies, which could otherwise strengthen community resilience to climate extremes. This study was guided by two objectives; to identify the indigenous knowledge used by pastoralists to survive natural disasters; and to examine the constraints limiting the effectiveness of indigenous knowledge in building pastoralist resilience.

Methods

Research sites

This study was conducted in Marsabit County, focusing on the Dukana and Sololo areas. It specifically targeted the Gabra and Borana communities, which are the largest ethnic groups residing in the county.

Data Collection Methods

The study involved 200 households selected through purposive and simple random sampling. Participants were 160 males and 40 females. Data was collected through interviews, direct observation, and focus group discussions. Trained enumerators administered questionnaires covering natural disasters, indigenous knowledge, and barriers to its effectiveness. Direct observations assessed environmental conditions and natural resources, while separate FGDs for men and women were used which provided additional insights and data triangulation.

Data Processing and Analysis

Qualitative data were organized to align with the study objectives. Quantitative data collected from household interviews were carefully edited, coded, and entered into SPSS (version 28) for analysis. Descriptive statistics, such as frequencies and percentages, were computed to provide a comprehensive overview of the study findings.

Study Results

Seasonal Livestock Mobility

Seasonal livestock mobility is a crucial survival strategy for pastoralists in Northern Kenya, enabling adaptation to environmental challenges. *Badheessa Gannaa* (wet season migration) follows the first rains, with livestock moving to peripheral grazing areas, while dry season migration brings herds closer to permanent water sources, often crossing borders (see Picture 1). Before migration, elders send herders to assess range conditions in fall-back areas and negotiate access with local communities. Men migrate with the livestock, leaving women, children, and elders at the homestead.



Picture 1: Seasonal Migration of the Borana and Gabbras of Northern

Indigenous early warning signs of weather patterns

Pastoralists in Northern Kenya use various indicators to predict droughts. Black intestines in slaughtered animals were identified by 41% of respondents, hot temperatures by 16%, and tree leaf-shedding by 15%. Additionally, 12% noted bird sounds and movements, 11.5% referred to star positions, and 4.5% mentioned a clear, cloudless sky. Other signs given included female camels crossing their rear legs and urinating on their thighs, livestock restlessness and slow movement. Signs of impending rain include cattle shaking their rear legs, playful behaviour in bulls, livestock hesitating to enter their shed, the flowering of plants like *Acacia nilotica*, and specific star patterns.

Herd diversification by pastoralists

The Borana and Gabbras of Marsabit practice herd diversification, rearing camels, cattle, goats, sheep, and donkeys. This strategy optimizes ecological resource use, enhances food security, and increases resilience to drought, making it an effective adaptation to climate variability. Camels emerged as the most preferred by 72% of respondents for their resilience, high milk production, and medicinal benefits. Goats and sheep (22%) were valued for rapid reproduction and ease of restocking, while 4% favoured cattle for their market value. Poultry (2%) were kept for their low theft risk. Figure 2 gives details

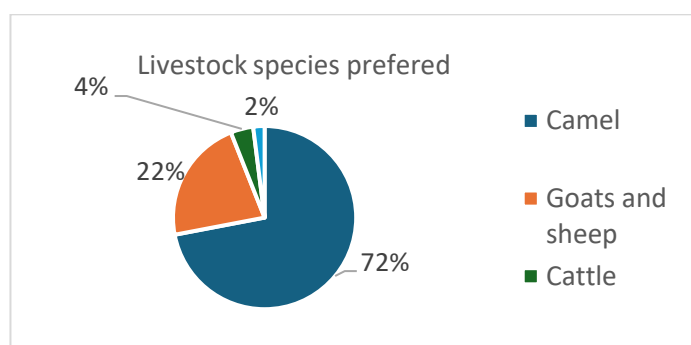


Figure 2: Livestock Species Preferred

Reliance on wild edible plants

Pastoralists in Marsabit rely on wild edible plants for survival during droughts and famines, with 86% of respondents affirming their use. Key plants for the Borana include *Grewia tembensis* (deka), *Cordia gharat* (mader), *Zizyphus mauritiana* (qurqura), *Berchemia* (jaj jab), *Grewia villosa* (ogomdi), and *Lannea alata* (kumude). The Gabra depend on *Grewia* spp., *Carissa edulis*, *Balanites aegyptiaca* (desert date), *Adansonia digitata* (baobab), and wild sorghum.

Indigenous ways of preserving foods among the pastoralists of Northern Kenya

Pastoral communities preserve meat and milk using indigenous traditional knowledge. Meat is cut into strips, sun-dried, deep-fried in animal fat, and stored in solidified fat in containers, known as enyas,

opera, nyirinyiri, or koche depending on the community, lasting 6 months to a year. Milk is preserved by smoking gourds with *Olea africana* leaves, which act as natural preservatives, enabling the milk to remain consumable for extended periods, regardless of weather conditions.

Challenges affecting the efficacy of Indigenous knowledge

Challenges to livestock mobility

The study found that while livestock mobility is essential for Borana and Gabra pastoralists to access rangelands and share resources, climate variability, especially frequent droughts, has caused water shortages, depleted grazing, and conflicts. Migration routes up to 600 km expose livestock to harsh conditions, leading to deaths. Shared resources lead to overgrazing, feed shortages, and disease transmission, making this adaptation increasingly unsustainable under changing climatic conditions.

Barriers of early warning methods

Most households (75%) affirmed the reliability of traditional early warning methods, 14% believed they were only reliable in the past, and 11% deemed them unreliable. Focus group discussions highlighted that increasing climate variability and severity have reduced their effectiveness. Lwasa et al. (2017) attributed this decline to the disappearance of traditional indicators, cultural shifts, and evolving religious interpretations.

Barriers to herd diversification

Opiyo et al., (2015) emphasized that herd diversification is a vital long-term adaptive strategy for pastoralists in Northern Kenya, driven by livestock's varied drought tolerance. This is supported by Wako et al., (2017), who found that goats and camels are highly drought-resilient, efficiently utilizing poor-quality forage, while cattle and sheep suffer higher mortality due to their lower adaptability. Despite its importance the strategy faces barriers such as livestock losses from recurrent droughts, high restocking costs, degraded foraging resources, reduced labor due to schooling, and youth migration to urban areas, limiting diversification efforts.

Challenges of accessing wild edible plants

Pastoral communities have traditionally depended on wild edible plants (WEPs) during drought-induced famines. However, their availability has declined due to settlement expansion, restricted access to fenced areas, overharvesting for construction materials, overgrazing in conflict zones, and the spread of invasive species like *Prosopis juliflora*, which hinder the growth and accessibility of WEPs.

Challenges of Indigenous methods of storing food

Challenges affecting Indigenous food and milk preservation among pastoralists include poor hygiene in processing, leading to illnesses like diarrhoea, livestock losses limiting inputs, and droughts reducing food shelf life. Additionally, recurring droughts have depleted plants traditionally used to extend milk preservation, further impacting food availability and storage practices.

Discussion, Conclusions and Implications

Discussion: The study highlights the critical role of indigenous knowledge in sustaining pastoral livelihoods in Northern Kenya through adaptive strategies like livestock mobility, early warning signs, herd diversification, and reliance on wild edible plants. However, challenges such as climate variability, resource constraints, and socio-cultural shifts necessitate integrating indigenous knowledge with modern resource management and technological approaches for enhanced resilience.

Conclusion: Indigenous knowledge is vital for pastoralists' adaptation to climate variability, offering time-tested strategies for resilience. However, its efficacy is eroding due to increasing climate and socio-economic challenges, the need for sustainable interventions.

Implications: Integrating indigenous knowledge into formal policies, conserving biodiversity, and promoting hybrid approaches combining indigenous knowledge with modern technologies are crucial. Capacity-building, financing for herd restocking, and biodiversity conservation are necessary to safeguard livelihoods amid climatic and socio-economic changes.

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