SPARC
Supporting Pastoralism and Agriculture in Recurrent and Protracted Crises

IGAD
ICPALD

ISSN 2977-9669
December 2025

TECHNICAL REPORT

STATUS OF LIVESTOCK MOBILITY IN KENYA AND ETHIOPIA

Mapping livestock routes and case studies on mobility blockages

Mohammed Yahya Said, Yasin Getahun, Julius Muyizzi, Irene Nganga, Bedasa Eba, Ambica Paliwal, Irene Mukalo and Fiona Flintan

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How to cite: Said, M.Y., Getahun, Y., Muyizzi, J., Nganga, I., Eba, B., Paliwal, A., Mukalo, I. and Flintan, F. (2025) *Status of livestock mobility in Kenya and Ethiopia: mapping livestock routes and case studies on mobility blockages.* Technical Report. London: SPARC Knowledge (https://doi.org/10.61755/MXQK8140).

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About SPARC

Climate change, armed conflict, environmental fragility and weak governance, and the impact these have on natural resource-based livelihoods, are among the key drivers of both crisis and poverty for communities in some of the world's most vulnerable and conflict-affected countries.

Supporting Pastoralism and Agriculture in Recurrent and Protracted Crises (SPARC) aims to generate evidence and address knowledge gaps to build the resilience of millions of pastoralists, agro-pastoralists and farmers in these communities in sub-Saharan Africa and the Middle East.

We strive to create impact by using research and evidence to develop knowledge that improves how the UK Foreign, Commonwealth & Development Office (FCDO), donors, non-governmental organisations, local and national governments, and civil society can empower these communities in the context of climate change.

Acknowledgements

This technical report is published through the Supporting Pastoralism and Agriculture in Recurrent and Protracted Crises (SPARC) programme, which is supported by the United Kingdom's Foreign, Commonwealth & Development Office (FCDO). Additional writing support was provided by the CGIAR Science Program on Future Food Frontiers. We thank all donors that contribute to the CGIAR Trust Fund.

The authors thank the consultants Dr. Samuel Tefera Alemu, formerly Senior Disaster Risk Management Coordinator at Oxford Policy Management and Addis Ababa University, and Dr. Abule Ebro for their review of this technical report. We acknowledge Mauri Vazquez, Head of Policy at ODI's Global Risks and Resilience programme, UK and Guy Jobbins, Executive Director, SPARC Consortium, UK for final comments and sign-off.

Lastly, thank you to the SPARC communications team, including Julie Grady Thomas, along with Terry Earle, ILRI and Ruby Cowling for copyediting, and Valerie Geiger for design and typesetting.

In Ethiopia, Mohammed Yahya Said, Yasin Getahun, Bedasa Eba, Julius Muyizzi and Fiona Flintan led the mapping process, with key facilitation and coordination support from Eskatnaf Getachew. We gratefully acknowledge the valuable contributions and support of the following individuals in the development of this work: Abdirahman Mahamoud, Abdu Seid Hassen, Abdikadar Shukri, Aklilu Busawa, Alem Abraha, Ayansa Waqijira, Birrneh Tesfaye, Chane Gebeyhu, Demelash Ayechile, Dinke Keneni, Dr. Bashir Ahmed Mehamed, Dr. Berhanu Alemayehu, Dr. Eskendir Kedir, Dr. Issa Abdujebar, Dr. Kasaye Berhe, Dr. Misganaw Mulugeta, Dr. Pilual Nyoch, Dr. Seid Ahmed, Fasil Weretaw, Gebeyehu Belachew, Gizachew Tazeb, Girma Mulugeta, Hagi Mohammed, Hailu Yirga, Hamedu Ali Hamedu, Jemal Ahmed, Mamo Gobena, Mequanint Damtie, Mesfin Mokonen, Mohammed Abdi Oumer, Mohamud Abdulahi Mohammed, Mulugeta Asefa, Musa Kedir, Mussa Alewi, Omod Okongo, Sultan Hussien, Tesfaye G/maryam, Tilahun Mekonen and Zarihun Janje.

In Kenya, Mohammed Yahya Said, Yasin Getahun, Irene Nganga, Blaise Okinyi, Frederick Aloo, Shem Kifugo, Julius Muyizzi and Fiona Flintan led the mapping process, with key facilitation and coordination support from Beth Njoroge and communications support from Polycarp Onyango. We extend our deepest gratitude to all those whose expertise, time and commitment greatly enriched the development of this work. In particular, we acknowledge the valuable contributions of the following individuals: Abdinoor I. Musa, Abraham Kiptanui, Amos Lekukuu, Anthony Gichuki, Benard Ouma, Benard Wanjohi, Bobby Ekadon, Caroline Misiko, Charles Ogechi, Damaris Amolo, David Mukabane, David Musyoki, Dickson Okello Chaulo, Edward Lentoror, Edward Ondigi, Eric Ahenda, Eric Mwatuni, Evans Kiplagat, Evans Mwiti Mathiu, Haret Hambe, Harisson Were, Henry Anjila, Henry Dundo, Henry Odanga, Hussein Madey, Jamin Kipkogei, James Kimathi, Jane Njuguna, John Eipa, John Kolei, Joseph Kilonzo, Joseph Musyoka, Josephat Maluki, Justus Gicovi, Kennedy Osoro, Kenneth Ochola, Margaret Ndumia, Martin Oyindo, Mary Situma, Michael Cheruiyot, Nzioka Wambua, Patrick Mweni, Peter Mwangi Mwai, Peter Ogutu, Peter Tache Golicha, Richard Bundotich, Robert Wakoli, Samuel Ndao, Stephen Musyoka, Teresia Ndung'u, Vincent Muohi, Virginia Ngunjiri and William Bore.

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ACRONYMS

ASAL	arid and semi-arid lands
FGD	focus group discussion
ICPALD	IGAD Centre for Pastoral Areas and Livestock Development
IGAD	Intergovernmental Agency for Development
KII	key informant interview
LIS	livestock information system
MILL	Ministry of Irrigation and Lowland

EXECUTIVE SUMMARY

Pastoral communities of the Horn of Africa depend heavily on livestock mobility: it is the cornerstone of their livelihoods, culture and resilience, particularly in Kenya and Ethiopia. Mobility allows herders access to dispersed grazing lands and water resources across variable climates, thereby sustaining people and ecosystems. This adaptive system is under increasing strain due to land fragmentation, policy restrictions and environmental degradation, which collectively undermine the sustainability of pastoralist livelihoods and the sociocultural fabric of their communities.

Pastoralism provides sustenance and income to millions of people, contributes significantly to national GDP and supports food security in the region. Mobile livestock production ensures the flow of animals and trade across borders. However, various pressures including land privatisation, intensive agriculture expansion, the spread of invasive species, urban encroachment and climate change have severely restricted the access pastoralists have to critical grazing areas, routes, and watering points. These constraints disrupt the ecological balance of rangelands and erode social institutions and indigenous knowledge systems that historically managed mobility and resource sharing.

Challenges

- **Land use conflicts:** the transformation of communal rangelands into private agricultural holdings has led to increased competition between pastoralists and farmers. This often results in conflicts over land use, undermining traditional grazing routes and diminishing available resources.
- **Environmental degradation:** the encroachment of invasive species, such as *Prosopis juliflora*, coupled with climate variability, has contributed to the depletion of biodiversity and the degradation of important grazing lands. This compromises livestock health and productivity.
- **Weakened governance structures:** the erosion of traditional governance systems has exacerbated conflicts and complicated resource management. The lack of effective institutions to mediate disputes and manage resources has left pastoral communities vulnerable.
- **Inadequate infrastructure:** poor infrastructure for transport, veterinary services and water supply has hindered pastoralists' ability to market livestock effectively and maintain livestock health.
- **Gender dynamics:** pastoral women often lack equal access to resources and decision-making processes. This constrains their ability to contribute to community resilience and economic stability.

Policy recommendations

- **Provide legal recognition of livestock routes.** Governments must establish or strengthen existing legal frameworks that formally recognise and protect traditional livestock routes essential for pastoral mobility. Legal protection is crucial for shielding these vital pathways from encroachment by agriculture and urban development.

- **Establish livestock information systems.** Developing comprehensive national livestock information systems is essential for monitoring livestock routes, resource availability and seasonal mobility patterns. These systems would enhance decision-making related to land use and facilitate better coordination among stakeholders across national borders.

- **Support participatory mapping initiatives.** Facilitating participatory mapping exercises involving pastoral communities will generate up-to-date knowledge of land use patterns. This local knowledge should inform planning and conflict resolution efforts, ensuring that community needs are prioritised.

- **Invest in infrastructure.** Targeted investment in essential infrastructure, such as water points, veterinary clinics and livestock markets, will help improve the health and productivity of livestock while enhancing pastoralists' ability to access markets.

- **Strengthen community-based governance.** Policies should aim to empower traditional governance systems to ensure sustainable resource management within communities. Strengthening local institutions facilitates efficient conflict resolution and equitable resource sharing.

- **Support cross-sectoral collaboration.** Establish mechanisms that foster collaboration among government sectors (agriculture, environment, livestock, and land use) to ensure cohesive policies.

- **Promote gender inclusivity.** Policies that advance gender equality in resource management and decision-making processes are crucial. Empowering women in pastoral communities enhances resilience and supports sustainable livelihoods.

- **Harmonise regional policy.** Encourage the Intergovernmental Authority on Development (IGAD) to take a more active role in harmonising policies across member states to support transboundary pastoral mobility. Coordinated efforts mitigate disputes and facilitate livestock movement across borders.

In conclusion

The resilience of pastoral communities in the Horn of Africa depends on addressing the multifaceted challenges they face. Effective and coordinated policy responses are vital for protecting pastoral mobility, promoting sustainable land use and supporting the cultural identity of these communities. By recognising traditional livestock corridors and implementing policies that bolster their rights, governments can help ensure a sustainable future for pastoralism in the region.

The path forward will require collaboration among local communities, national governments, regional bodies and international partners. By prioritising the integration of traditional practices with contemporary governance and resource management strategies, stakeholders can create a supportive environment for pastoralists, ultimately benefiting food security and regional stability.

1. INTRODUCTION

Pastoralism is a crucial economic activity in the Intergovernmental Agency for Development (IGAD) region, supporting national GDPs, food security and the livelihoods of millions (ICPALD, 2020b; ICPALD, 2018). To enable pastoralists to effectively use drylands, pastoralists with their livestock need to be able to move across a rangeland of patchily distributed resources, highly influenced by low, variable and comparatively unpredictable rainfall (Scoones, 2024). This includes being able to access the best grazing available at different times of the year, including dry season grazing areas found along rivers or where there is a permanent water source. These 'key sites' not only provide critical grazing when grass and browse elsewhere have been depleted, but also are part of strategies to allow the resting of wet season grazing areas and to kill off livestock parasites. Access to these sites is also important for animal husbandry.

Additionally, movement is vital for trade and accessing markets, including across country borders. These routes have also been important for building closer economic ties in the region; their use has social and political benefits, allowing herders to adapt to new economic and social challenges and opportunities (Little, 2007; Aklilu, 2008). The cross-border clan relationships that have underpinned trade in the past are increasingly giving way to multiple-clan business enterprises that are based on complex market arrangements and channels. These involve extensive networks of people and help build trust and integration. However, as these traditional and emerging mobility and trade systems evolve, they face the ongoing challenge of land and resource tenure insecurity.

Land and resource tenure security in Horn of Africa pastoral areas is weak (Robinson and Flintan, 2022; Flintan et al., 2021). This has contributed to the encroachment of rangelands and allocation of land to non-pastoral uses, which have proceeded at an alarming rate over the last decade (Davies and Moore, 2016; Nkedianye et al., 2019; Flintan et al., 2011). Livestock routes are blocked or are sources of conflict between pastoralists and other land users (Lesorogol and Lesorogol, 2024; Wachira et al., 2024). Land is leased to investors with little, if any, thought or provision for maintaining access to rivers and other water sources (Lind et al., 2020; Lind and Rogei, 2025). With increasing pressure on land and resources, conflicts between different land uses and land users are set to grow.

Despite their critical value for local livelihoods and national economic growth in the Horn of Africa, livestock routes receive poor protection (Flintan et al., 2021). No policy or legislation focuses specifically on livestock routes. Livestock routes and their use are poorly documented and detailed maps are either out of date or non-existent. The servicing of routes (including resting places for feed, water and shade) relies on haphazardly planned and implemented local initiatives that are inconsistent and often inadequate. Veterinary posts, if they exist at all, are poorly resourced. As a result, the health and safety of livestock and livestock herders using these routes are at risk, and it is often the case that livestock arrive at their destination in much poorer condition than when they set out, resulting in lower prices and sales.

Recognising these challenges and the growing importance of pastoral mobility for regional trade and integration, regional bodies have begun to take steps to improve the governance and coordination of livestock movement. In 2020, the IGAD, or more specifically, the IGAD Centre for Pastoral Areas and Livestock Development (ICPALD) in the Horn of Africa launched the Protocol on Transhumance (ICPALD, 2020a). Through the protocol, IGAD seeks to support

livestock development through secured and well governed livestock mobility. The purpose of this protocol is to exploit the full social and economic potential of the pastoral system by:

- allowing free, safe and orderly cross-border mobility of transhumant livestock and herders in search of pasture and water as an adaptation mechanism in response to climate change and weather variability within the IGAD region
- committing member states to invest adequate resources in pastoral regions and in competent institutions managing transhumance
- the harmonisation of national laws and policies related to livestock and pastoral development, land use and governance, disease control and cross-border measures.

Well-serviced and safe livestock corridors that facilitate movement are the key to the implementation of this protocol. As Article 4 states:

> The IGAD Secretariat shall coordinate and support member states, with the involvement of respective communities, to identify and map the existing and new stock routes and resources therein and to designate them as 'transhumance corridors' through which transhumant livestock and herders may traverse.

Additionally, meat and dairy consumption is growing throughout the region and the prospect of both rapid urban population growth and rising incomes suggest that demand will continue to grow significantly. With land pressures increasing, and farmers and herders increasingly operating in the same food production space, there is an urgent need to strengthen protection for livestock corridors and supporting services, to facilitate the necessary movements of livestock and pastoralists while preventing land use conflicts.

As the IGAD Transhumance Protocol moves to implementation there arises an important opportunity to support this process, working with member states to develop national maps of livestock routes, determining the status of those routes, conducting research on where route blockages or conflicts are occurring, and making recommendations to member states and IGAD for improvements.

In response, SPARC carried out a comprehensive mapping and documentation of livestock route maps in Kenya and Ethiopia to inform resource planning and ensure up-to-date route information. The first and crucial step was to map existing resources – specifically, livestock routes – in a standardised way. This included information on supporting infrastructure and on where routes were blocked or no longer functioning. Information collected will contribute to a database and information system that multiple organisations can use to manage and develop the livestock sector effectively.

Following the mapping, the identification of infrastructure and the status of route functionality, local studies were carried out with pastoralist communities to understand why routes are being blocked in four locations. Though the contexts were somewhat different, the responses to those challenges were remarkably similar, highlighting clear intervention points.

This technical report provides a summary of the project outputs, including the national mapping process and maps produced in Ethiopia and Kenya and a summary of the pastoralist community case studies. The report concludes with recommendations for policymakers and regional bodies, including IGAD.

2. MAPPING LIVESTOCK ROUTES IN ETHIOPIA AND KENYA

2.1 Rationale and limitations of the study

The aim was to produce 'first-cut' national maps of major livestock routes which would serve as a starting point for later, more detailed, mapping, validation and data collection. The mapping was done across Kenya and Ethiopia to capture all major routes with particular attention to pastoral areas where mobility is of particular importance. Some routes follow main roads in some locations, where livestock transport shifts to movement by truck rather than walking. Where information was available, grazing reserves and water points were also mapped. Additional livestock infrastructure was also documented (e.g. veterinary posts, livestock loading facilities, quarantine centres and dipping tanks).

The maps and supporting information provided here is drawn from the knowledge and data provided by government livestock experts from counties in Kenya and regions in Ethiopia. The process of data collection is described below. Following mapping meetings, gap filling and validation were carried out through follow-up conversations with the same livestock experts and their offices. The data collected is being provided to the national governments to establish databases on livestock routes and supporting infrastructure and can continue to be populated over time. It was not within the scope of this initiative to map routes at lower levels with greater detail; follow-up projects are encouraged to do this.

2.2 Mapping methodology and process

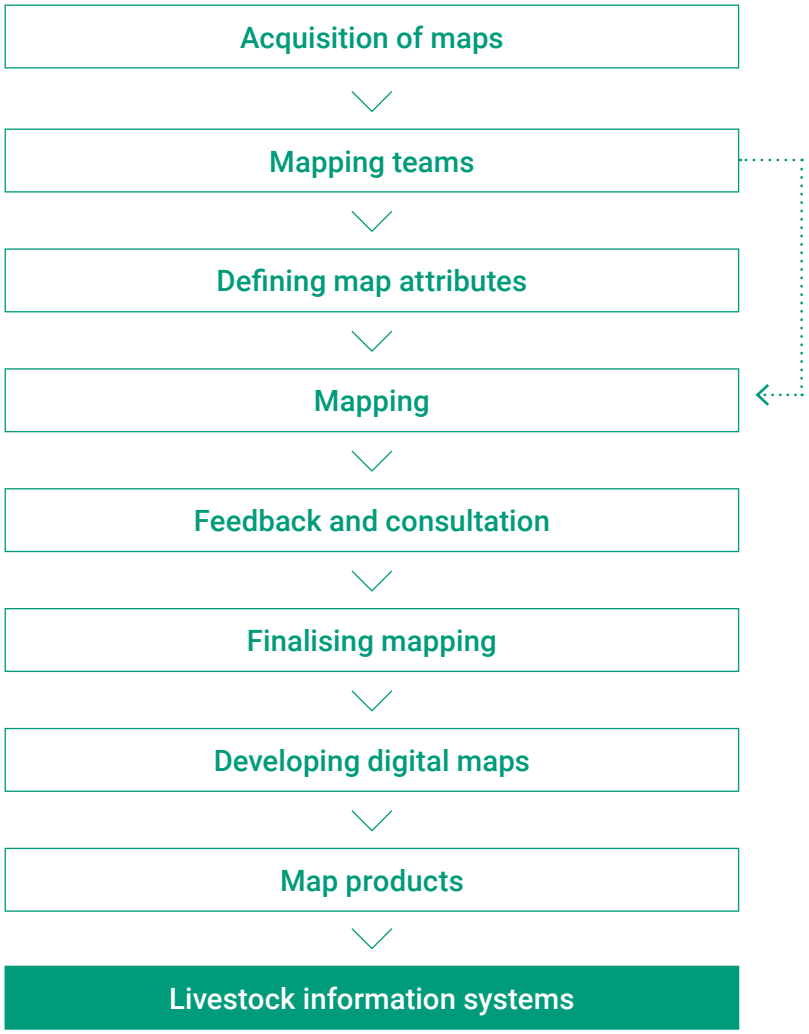
The mapping process in both countries started off with introductory meetings with representatives from the Ministry of Agriculture in Ethiopia and the State Department of Livestock, Ministry of Agriculture in Kenya, to reach agreement on the importance of the mapping initiative and garner support for the process. This was followed by preparation for and then actualisation of an intensive mapping process, including three-day workshops that brought together government technical experts and other stakeholders to produce a first version of each national route map. In Ethiopia, the mapping workshop took place in Adama between 26 and 28 February 2025, and, in Kenya, in Nairobi between 27 and 29 May 2025.

Mapping livestock routes in both countries followed a structured process to ensure as much accuracy, consistency and broad stakeholder participation as possible (see Annex 1). The initiative began with the acquisition and preparation of baseline topographic maps, which formed the foundation for all subsequent activities. A total of 24 topographic maps in Kenya and 31 in Ethiopia at a scale of 1:250,000 were purchased to cover each country.

After map preparation, the process advanced through nine steps (Figure 1), beginning with the establishment of mapping teams. These teams were tasked with systematic data collection, field validation and ensuring the integrity of mapped features. Key mapping attributes included livestock routes, water points, grazing reserves and market access corridors, with geospatial parameters clearly defined for consistency.

Direct engagement with livestock specialists was central to the exercise. Local knowledge was used to refine mapped features. At the same time, follow-up stakeholder consultations helped validate results, resolve discrepancies and ensure the maps reflected realistic and usable livestock mobility patterns across the two countries.

FIGURE 1. CYCLE OF MAPPING PROCESS LEADING TO LIVESTOCK INFORMATION SYSTEMS



Note: this structured approach provides a replicable model for livestock route mapping in similar contexts.

Source: International Livestock Research Institute.

Once verified, the data was digitised and compiled into a series of digital map products. These will be stored in a livestock information system (LIS), a centralised platform designed to support regional planning, monitor livestock movement, inform policy decisions and enhance the resilience of pastoralist and agro-pastoralist communities. The LIS will be maintained in relevant ministries.

Step 1: acquisition of maps

The first step involved acquiring up-to-date topographic maps to serve as the base layer for all subsequent data collection and mapping activities. After evaluating several options, the team selected high-resolution base maps and printed them from services.arcgisonline.com/ArcGIS/rest/services/World_Topo_Map/MapServer. This offered reliable and current topographic information suitable for national planning. Given the wide geographic scope of the initiative, a scale of 1:250,000 was chosen. This scale provides an optimal balance between spatial detail and national coverage, making it ideal for identifying the main features of interest. The maps were printed, with additional copies as needed to ensure complete and seamless coverage of all areas.

Step 2: mapping teams

The success of the mapping exercise hinged on the strategic selection and composition of the mapping teams. These teams were tasked with the systematic mapping of livestock routes across the two countries to ensure comprehensive national coverage and the production of accurate, credible outputs.

In Ethiopia, the workshop brought together 41 participants from seven regions or clusters of regions covering the whole country, each working as a team. Participants included:

- animal health and veterinary officers from South West Ethiopia, Gambela, Benishangul-Gumuz, Harari, Tigray, Somali, South Ethiopia, Amhara, Oromia and the Ministry of Agriculture (MoA)
- livestock production and animal science specialists from Afar, Somali, Oromia, Central Ethiopia, Amhara, Benishangul-Gumuz and Gambela
- GIS and remote sensing experts from Afar, South West Ethiopia and Somali
- marketing and agricultural economics professionals from Tigray and Somali
- rural development officers from Afar and Oromia
- policy and planning representatives from the Ministry of Agriculture and the Ministry of Irrigation and Lowland (MILL).

In Ethiopia, the mapping built on broader mapping processes already conducted by MILL as part of the Lowlands Livelihoods and Resilience Project and other projects such as One Health Units of Human, Environment, Animals and Livelihoods (see Getahun, 2024).

In Kenya, the activity brought together 66 participants from all 47 counties, representing a diverse and experienced team of professionals in livestock production, veterinary services and range management. The majority were county directors of livestock production, deputy and assistant directors, veterinary officers and senior livestock production officers. The mapping exercise was organised through seven regional teams, each assigned specific counties to ensure comprehensive coverage.

TABLE 1. TEAMS DIVIDED BY CLUSTERS OF COUNTIES

Team	Counties covered
Team 1	Baringo, Elgeyo-Marakwet, Laikipia, Samburu, Trans-Nzoia, Turkana, Uasin Gishu and West Pokot
Team 2	Garissa, Isiolo, Mandera, Marsabit and Wajir
Team 3	Western region, including Bomet, Bungoma, Busia, Homa Bay, Kakamega, Kericho, Kisii, Kisumu, Migori, Nandi, Nyamira, Siaya and Vihiga
Team 4	Central and parts of eastern Kenya, covering Embu, Kiambu, Kirinyaga, Meru, Muranga, Nakuru, Nyandarua, Nyeri and Tharaka-Nithi
Team 5	Kitui, Machakos and Makueni counties
Team 6	Coastal region, including Kilifi, Kwale, Lamu, Mombasa, Taita Taveta and Tana River
Team 7	Kajiado, Nairobi and Narok

Source: Authors' own.

The teams' expertise was instrumental in supporting the mapping of livestock routes across the country. Drawing from their in-depth knowledge of local livestock movement patterns, grazing zones, animal health challenges and cross-border dynamics, the participants provided critical insights and ground-truth data. Their involvement ensured that the mapping process was both technically sound and contextually relevant, aligning with county realities and national objectives. The collaborative effort laid a strong foundation for the development of formalised and sustainable livestock routes to enhance mobility, market access and resource management across the two countries.

Step 3: defining the map attributes

A critical step in the process was defining key map attributes in order to guide data collection, standardise outputs and ensure consistency across regions. The attributes were selected on the basis of their relevance to pastoral mobility, livestock management and rangeland use. Core features included primary and secondary livestock routes, seasonal migration paths, watering points, grazing areas, resting points, markets and crossing points, such as rivers and roads. Additional socioeconomic and infrastructure-related features, such as veterinary service locations, conflict hotspots and enclosure areas, were also considered based on the regional context. The attribute framework was developed collaboratively by technical experts, drawing from national guidelines, field experience and stakeholder consultations.

Table 2 outlines the items mapped. These represent the core features essential to understanding and managing livestock mobility across Ethiopia and Kenya.

Each feature was further classified to capture functional status and use. Livestock routes were categorised according to their importance and functionality (e.g. major functional, seasonal or non-functional), while markets were classified by hierarchy and operational status, including primary, secondary and border markets. Water points included boreholes, dams, salt licks and wells, which are vital for livestock hydration. Infrastructure covered facilities such as animal health centres, dip tanks, checkpoints and slaughterhouses.

TABLE 2. SUMMARY OF MAPPING ATTRIBUTES

Main feature	Class	
Livestock routes	Major functional	Minor functional
	Major functional seasonal	Minor non-functional
	Major non-functional	
Markets	Primary	Primary/non-functional
	Secondary	Non-functional
	Primary/secondary	Border
Water points	Borehole	Salt licks
	Dam/pond	Well
Infrastructure	Animal health centre, clinic, laboratory	Loading and off-loading facility
	Check point	Night camp
	Dip tank	Quarantine facility
	Holding ground	Slaughterhouse
Pasture area	Shared	Shared and conflict pastures
	Conflict	

Source: International Livestock Research Institute.

Step 4: mapping

Capacity building and skills development

The mapping exercise was designed not only as a data collection effort but also as a practical, hands-on learning experience for participants. As part of the process, participants were equipped with essential skills in map reading, mapping techniques, standardised coding of geographic features and effective notetaking. These skills were developed during the mapping exercise itself, allowing participants to immediately apply what they learned in real-time mapping conditions.

Emphasis was placed on accurately interpreting topographic maps at a 1:250,000 scale, identifying key features such as livestock routes, water points and grazing areas. Training on coding geographic objects ensured that all teams used a consistent framework for data classification, which improved the reliability and comparability of results across regions. Documentation practices were also strengthened, enabling teams to capture both spatial and contextual information effectively. This integrated approach to skill development enhanced the accuracy, consistency and credibility of the data collected, while also contributing to institutional capacity building for future livestock and rangeland monitoring efforts.

Participatory mapping process

The mapping was designed as a participatory and collaborative process between government experts, engaging their regional teams in hands-on data collection and map interpretation. The first step involved sorting and assembling the topographic map sheets specific to each region. Once the relevant maps were prepared, they were distributed to the respective teams, who began the mapping work simultaneously.

Each team was composed of diverse experts and local representatives and was tasked with identifying and marking key features directly onto the printed maps. To ensure coordination and accountability, each team appointed a team leader, a notetaker and a designated 'mapper' responsible for marking features on the maps. These roles were crucial in managing group discussions, recording local knowledge and maintaining the accuracy of the mapped information.

The participatory mapping process spanned three full days. Each day focused on a different mapping theme, such as livestock routes, water points, infrastructure and grazing areas, with at least half a day dedicated to each thematic layer. This allowed adequate time for discussions, verification and consensus building within each team.

On the final day, all sub-teams met to review and consolidate their outputs to ensure that mapped features were seamlessly aligned across administrative boundaries, avoiding overlaps or gaps. This was achieved by creating a mosaic of all regional maps into a single, harmonised national map and dataset. The participatory approach strengthened the technical accuracy and local relevance of the mapping and promoted ownership and shared understanding among stakeholders involved. The photos in this report provide a visual summary of the participatory mapping process, capturing key moments.

An integral component of the mapping process involved scanning and digitising all annotated regional maps. Each hardcopy map, containing both coded features and accompanying field notes, was scanned at a high resolution and saved in TIFF format to preserve detail and ensure compatibility with GIS software. Prior to digitisation, each scanned map was georeferenced using map coordinates to accurately align it within the national spatial framework. Digitisation was then performed by extracting and encoding spatial features according to a predefined classification scheme, developed in alignment with the structure and requirements of the central livestock route database. This ensured consistency between the spatial data and the recorded attributes. Figure 2 is an example of a scanned and georeferenced map used in the digitisation process. Part of the mapping involves scanning all the maps and digitising the work, aligning what was coded in the map and what was written. All the maps were scanned and saved as TIFF files and each map was registered using the map coordinates before digitising. The coding was based on the scheme of the database designer. Figure 2 shows the scanned image.

Mr. Blaise Okinyi Akite, Assistant Director of Livestock Production, State Department of Livestock, Kenya officially opening the workshop on Mapping Livestock Routes in Kenya, 27 May 2025.
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FIGURE 2. SCANNED IMAGE OF A MAP TILE SHOWING ALL FEATURES CODED BY THE REGIONAL MAPPING TEAM

Source: International Livestock Research Institute.

Coding the maps using symbols of different colours.
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Step 5: feedback and consultation

Feedback and consultation were critical components of the mapping process, ensuring that the outputs were technically sound and validated by the stakeholders involved in the mapping process. Throughout the exercise, teams engaged in regular discussions and reviews, both within their regional groups and during the final consolidation phase. Additionally, inputs were gathered from field experts, local authorities and technical personnel who contributed valuable insights on the functionality and accuracy of mapped features such as routes, water points and grazing areas. This feedback loop helped refine the classification of features, resolve discrepancies across administrative boundaries and enhance the reliability of the final maps. The consultative approach strengthened stakeholder (particularly government) ownership of the data and increased the relevance of the outputs for planning and decision-making at both regional and national levels.

Step 6: finalising the maps

This step brought together the outputs from all regional teams into a cohesive national map dataset. This involved a thorough review, verification and harmonisation of the mapped features in discussions with the livestock experts through email or phone to ensure consistency, completeness and spatial accuracy across regional boundaries.

All scanned and digitised maps were cross-checked against field notes and standardised coding schemes to correct any discrepancies and align with the national database structure. Key features such as livestock routes, water points, markets, infrastructure and grazing areas were systematically validated and integrated into a unified digital map. The final output represents a comprehensive, accurate and user-informed representation of the livestock mobility network in both countries, ready for use in decision-making, policy planning and further analysis within a livestock information system.

Step 7: developing digital maps

Following the finalisation and verification of the mapped features, the next phase focused on the development of high-quality digital maps. Using GIS software, the digitised data from all regions were compiled and integrated into a single geospatial database. Each mapped feature was digitised according to the established classification scheme, with standardised attribute tables ensuring consistency and usability. Spatial editing and topology checks were conducted to eliminate overlaps, gaps and other geometric errors. Legends were added to the maps to enhance readability and interpretation.

Teams in Ethiopia assembling maps for their regions.
© International Livestock Research Institute

Step 8: map products and major outputs of the mapping exercise

The major outputs of the mapping exercise consist of six thematic maps, each representing a critical element of the countries' livestock mobility and rangeland management systems. These six maps cover:

- livestock routes
- livestock markets
- infrastructure
- water resources
- pasture areas
- all five themes combined in an integrated map.

Each map provides spatial insights into the distribution, functionality and connectivity of livestock-related features across the country. The final maps are still being completed and will be presented in country reports. Below, we provide examples of the maps produced to date.

Additionally, a geospatial dataset of major functional seasonal livestock routes across the two countries was produced. It captures critical attributes, such as the origin and destination of each route, the complete travel path and the underlying reasons for livestock movement ranging from seasonal grazing to market access or, in some cases, informal or illegal trade. Each route entry is enriched with metadata, including classification, total length and data source. The full data will be consolidated in forthcoming country reports.

Step 9: developing livestock information systems

A livestock information system (LIS) is a structured framework for collecting, storing, analysing and disseminating data related to livestock production, health, movements and marketing. It integrates various types of information, such as animal identification, breeding records, disease surveillance, vaccination history, feed resources and pasture conditions, to support evidence-based decision-making by farmers, veterinarians, policy-makers and researchers. By enabling real-time monitoring and efficient data sharing across stakeholders, a livestock information system will enhance livestock management, improve traceability and food safety, support early warning systems for disease outbreaks and contribute to sustainable agricultural

Mapping participants in Kenya.
© Polycarp Onyango/ILRI

development. In regions where pastoralism and agro-pastoralism are prevalent, such systems are especially critical for managing mobility, resource access and responding to climate and market variability.

It has been recommended to both the Ethiopia and Kenya Ministries of Agriculture that they establish a LIS using the data produced by this mapping process. For this to happen, the following actions are recommended:

- Mobilise long-term funding commitments to enable the consistent acquisition, processing and updating of base maps and livestock movement data. Budget allocations should support both analogue and digital components of the mapping process.
- Form regional or county-based mapping teams within national livestock and land-use agencies composed of GIS specialists, livestock officers, local community representatives and ICT technicians. Cross-sectoral expertise improves data richness and integration.
- Develop a national policy or guideline to define the minimum required spatial attributes (e.g. route type, usage frequency, seasonal variation) to enable interoperability across districts, systems and planning sectors.
- Mapping outputs should be subject to structured feedback loops with communities and end users before finalisation. Legislation or technical protocols should require consultation steps to validate the accuracy and cultural relevance of mapped information.
- Mandate public agencies to convert paper maps into digital formats and store them in centralised livestock information platforms. Policies should promote open data access while protecting sensitive community data.
- Integrate livestock mobility maps and derived products into broader infrastructure, health, land-use and climate resilience planning frameworks. This increases their relevance and impact across government functions.
- Develop interoperable systems, where digital maps feed directly into the LIS, to link with agriculture, climate and emergency response systems for real-time decision support.
- Harmonise livestock mobility policies with environmental protection, land tenure and rangeland governance frameworks to reduce conflict and ensure sustainable use of communal grazing corridors and water points.

Mapping participants in Ethiopia.
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3. THE LIVESTOCK ROUTE MAPS

3.1 Ethiopia routes, markets and supporting infrastructure

Ethiopia livestock routes

It was noted by livestock experts, particularly in Afar and Somali regions, that if the mapping was done at a lower level and with more detail, many more non-functional routes would be identified. The blockage of routes is becoming a critical problem that demands an immediate response if pastoralism production is to be optimised and continue contributing to food and livelihood security.

The distribution of livestock routes across Ethiopia's regions reflects a wide range of functionality and seasonal usage, totalling 330 routes. The Oromia region ranks first with 119 routes, predominantly minor functional (89), indicating well-used but less developed paths. Somali Region ranks second with 94 routes, mainly major functional (26) and major functional seasonal (20), reflecting the region's strong reliance on pastoral mobility. South Ethiopia regions rank third with 46 routes, with a notable share of minor functional (23) and major functional seasonal (6). Afar ranks fourth with 24 routes, of which 23 are major functional seasonal, underscoring strong seasonal movement patterns. Amhara ranks fifth with 22 routes, split almost evenly between major functional (10) and minor functional (10). Gambela follows closely, also with 22 routes, but more diversified across categories, including major functional seasonal (10) and major non-functional (4).

Benishangul-Gumuz ranks seventh with 12 routes, with major functional (4) and minor functional (4). South West Ethiopia ranks eighth with 12 routes, showing notable major functional (7) and major functional seasonal (5). Sidama ranks ninth with 19 routes, dominated by minor functional (13). Central Ethiopia ranks tenth with 13 routes, while Tigray ranks eleventh with only 6 routes.

Among city administrations, Dire Dawa (four routes), Harari (four routes) and Addis Ababa (three routes) contribute a limited share to the overall network.

Overall, the data highlights a diverse but uneven distribution of routes across Ethiopia, with Oromia and Somali together accounting for more than 64% of all routes, underscoring their central role in livestock mobility (Figure 3).

The distribution of livestock routes across Ethiopia, measured in kilometres and categorised by functionality and region, highlights considerable diversity in extent and utility. The total mapped network measures 25,504 km, with the majority composed of major functional (12,863 km) and minor functional (6,263 km) routes, underscoring the importance of both long-distance corridors and local connections in livestock mobility.

Oromia has the most extensive network (7,383 km), dominated by minor functional routes (4,536 km) complemented by major functional routes (2,061 km) and 716 km of seasonal corridors, emphasising its central role in livestock movement, trade and connectivity. The Somali region (4,839 km) follows, with a balance of major functional (2,644 km) and

seasonal routes (2,140 km), consistent with its predominantly pastoral systems. Amhara (2,992 km) and Afar (1,714 km) also maintain significant networks, with Amhara showing a mix of major (2,291 km) and minor functional (601 km) routes, while Afar is notable for its reliance on major seasonal corridors (1,507 km) supporting transhumant and migratory grazing patterns.

Smaller but important networks are evident in Sidama (1,426 km), South Ethiopia (1,213 km), Gambela (1,113 km) and Benishangul-Gumuz (958 km), each combining functional and seasonal pathways. In Gambela, however, 288 km of major routes and 25 km of minor routes are classified as non-functional, reflecting abandonment or obstruction due to factors such as land conversion, insecurity or infrastructure development. Similarly, Oromia has 70 km of non-functional major routes, adding to the national total of 382 km of disused corridors (357 km major, 25 km minor).

Smaller administrative regions also play a role: Addis Ababa (570 km), Harari (552 km), Central Ethiopia (828 km), South West Ethiopia (785 km), Dire Dawa (428 km) and Tigray (703 km), though limited in extent, provide vital localised connections for livestock movements.

Excluding the non-functional segments, the cumulative useful length of Ethiopia's livestock routes is 25,122 km, forming a critical backbone for pastoral and agro-pastoral livelihoods, facilitating market access and supporting sustainable rangeland and land use planning.

Ethiopian markets

During the mapping process, 499 livestock markets were mapped and categorised by functionality and type. This covers larger markets and is not exhaustive, missing smaller but no less important informal markets. It is recommended that further mapping and details at lower levels be added in time. Most mapped markets are classified as primary markets (318 in total), underscoring their central role in Ethiopia's livestock economy, with 181 secondary markets. Oromia dominates with 238 markets, including 180 primary and 53 secondary markets, alongside 4 border markets, reflecting its leading position in national livestock trade (Figure 4).

Amhara follows with 64 markets, consisting of 49 primary and 14 secondary markets, with an additional primary/non-functional facility, while South Ethiopia (38 markets) combines 9 primary markets, 10 primary/non-functional facilities and 19 secondary markets, highlighting a mix of active and partly functional infrastructure. Somali Region (50 markets) is characterised by 14 primary markets and a relatively high number of 33 secondary markets, showing the importance of localised and cross-border trade links, despite 3 non-functional facilities.

Other regions report smaller totals: Afar has 19 markets (13 primary and 6 secondary); Tigray 21, with 10 primary and 8 secondary markets; and South West Ethiopia 22, which includes 11 primary, 5 primary/secondary and 3 secondary markets.

Benishangul-Gumuz (14) stands out for its 3 border markets and 3 primary/border markets, highlighting its role in cross-border exchanges. Gambela (22) has a mix of 8 primary, 2 secondary and a notably high 5 non-functional markets, suggesting infrastructure gaps. Notably, 13 border markets across several regions facilitate cross-border livestock flows, while 10 non-functional markets and 3 primary/non-functional sites signal areas in need of revitalisation. Some markets were also noted in the administrative zones of Addis Ababa, Dire Dawa and Harari, but were not sufficiently captured and need further data collection.

Overall, the data highlights the dominance of Oromia and Amhara in livestock trade infrastructure, the important role of secondary markets in Somali and South Ethiopia and the strategic value of border markets in Benishangul-Gumuz, Gambela and Tigray. At the same

time, the persistence of non-functional markets underscores the need for targeted investment to restore or upgrade key facilities, particularly in regions where pastoralism and cross-border trade are critical for livelihoods.

Ethiopian livestock infrastructure

In total, 401 livestock infrastructures or facilities were categorised by region and type. The Oromia mapping team identified 97 facilities, reflecting the most diversified livestock service infrastructure. The team recorded the highest number of animal health clinics (19), a strong network of checkpoints (23) and a significant number of slaughterhouses (31), underscoring its central role in livestock health, trade and meat processing (Figure 5).

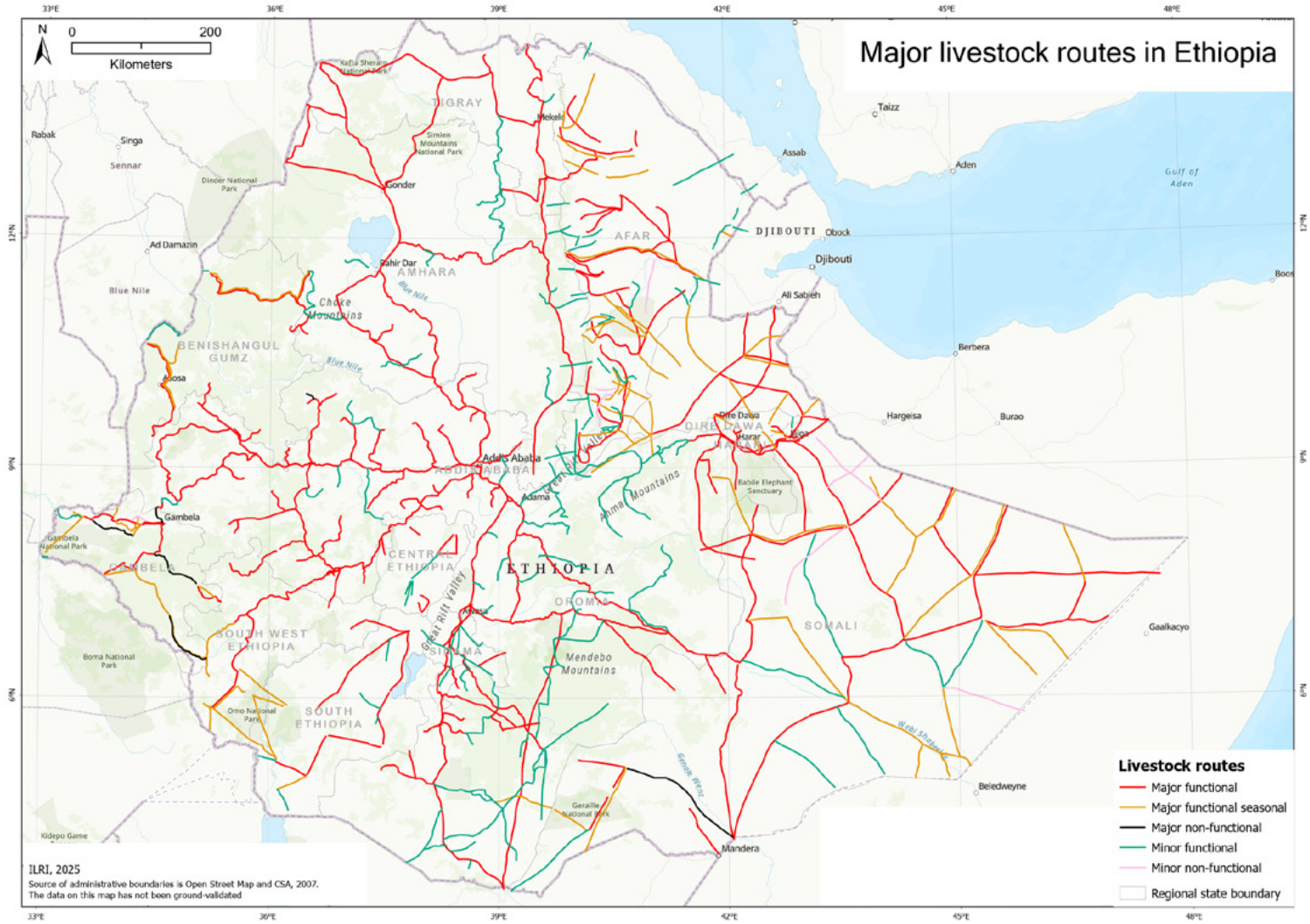
South Ethiopia Region follows with 42 facilities, dominated by animal health centres (31) and slaughterhouses (11), pointing to substantial veterinary service coverage. South West Ethiopia Region (37) and Benishangul-Gumuz (36) also have robust livestock infrastructure, with the latter notable for its concentration of checkpoints (8) and night camps (8), along with animal health centres.

Somali Region (65 facilities) ranks third overall, with a distinctive mix of checkpoints (17), dip tanks (9) and loading/off-loading facilities (11), combined with 9 night camps and 2 quarantine facilities, reflecting the region's pastoral mobility and cross-border trade dynamics. Afar (27 facilities) and Amhara (26) show moderate but diverse infrastructure, with Afar standing out for its relatively high number of animal health centres (17) and Amhara for a mix of animal health centres (17), loading/off-loading facilities (4) and slaughterhouses (2).

Tigray (15 facilities), Sidama (18) and Central Ethiopia (26). Gambela (9 facilities) records the lowest presence of livestock facilities, suggesting significant gaps in service provision despite the region's pastoral and agro-pastoral systems. Some infrastructure was also noted in the administrative zones of Addis Ababa, Dire Dawa and Harari, but was not sufficiently captured; further data collection is needed.

Overall, the data highlights the uneven distribution of livestock support infrastructure across Ethiopia, with Oromia, Somali and Southern regions hosting the bulk of facilities, while pastoralist-dominated regions like Afar and Gambela remain underserved. These disparities underscore the need for region-specific investments in veterinary, transport and trade-related infrastructure to strengthen livestock production and pastoral livelihoods, particularly in marginalised regions.

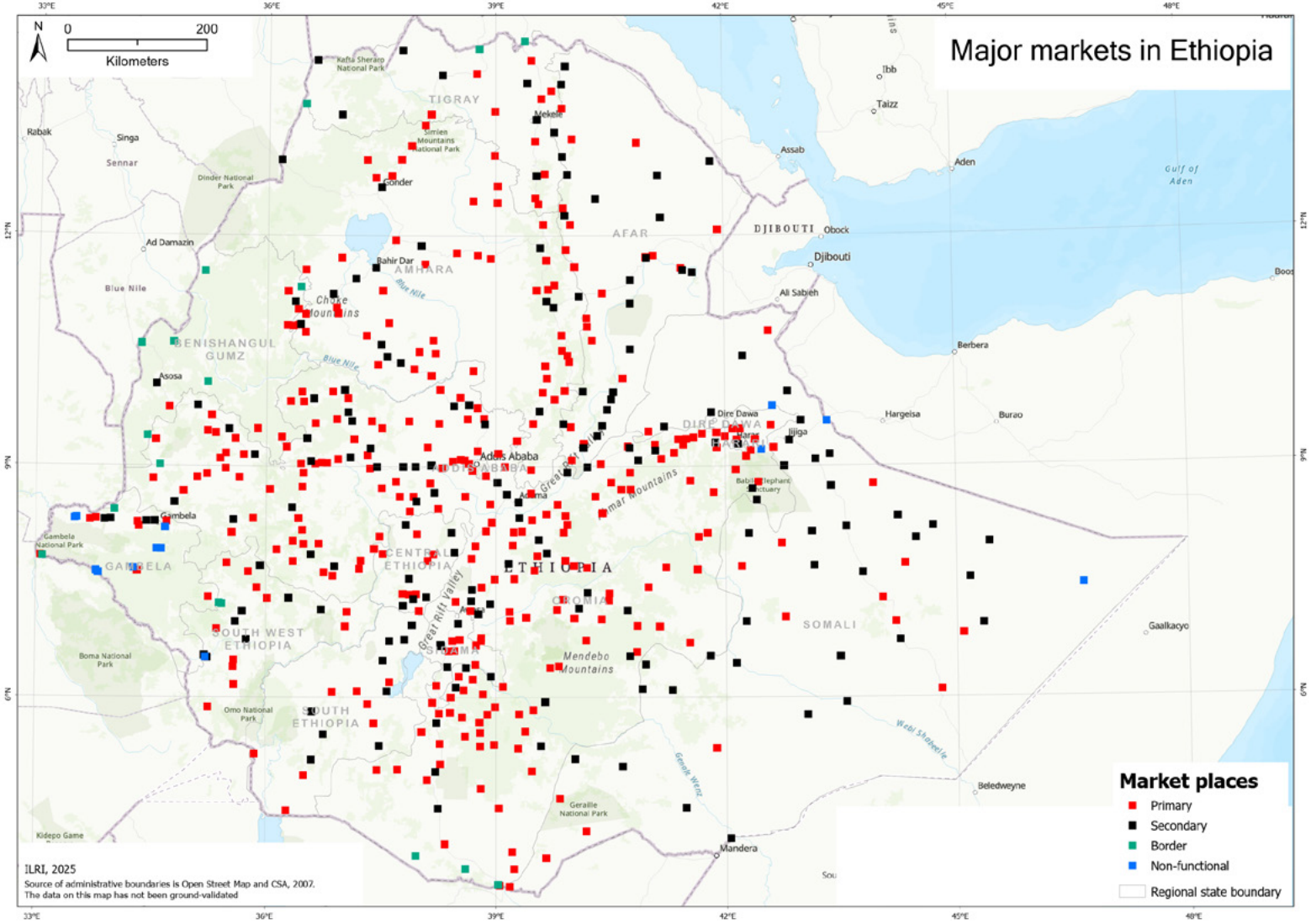
FIGURE 3. DISTRIBUTION OF MAJOR LIVESTOCK ROUTES ACROSS ETHIOPIA AS IDENTIFIED BY PARTICIPANTS IN THE WORKSHOP



Note: This is a high-level mapping. Lower-level mapping would reveal many more routes.

Source: International Livestock Research Institute.

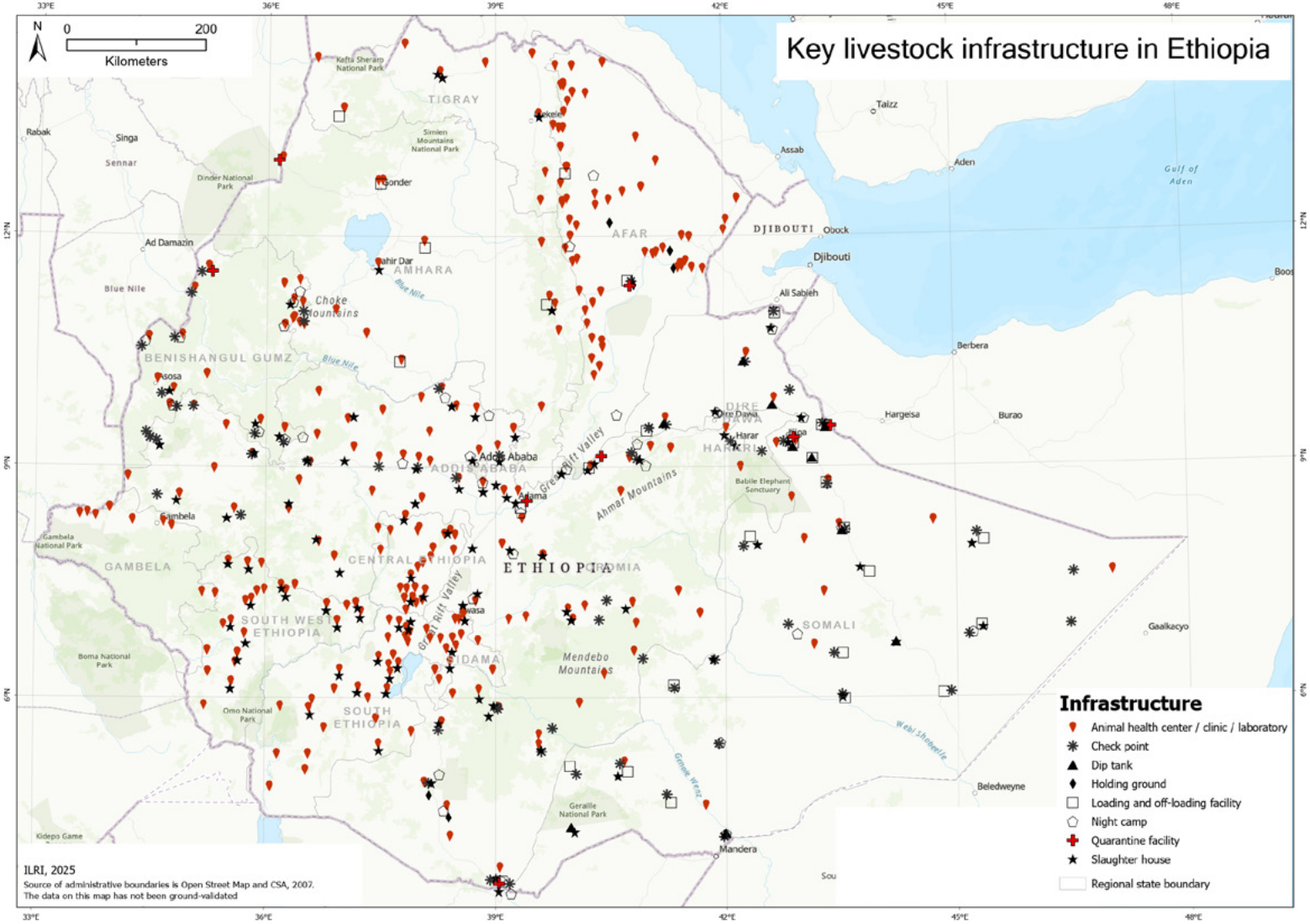
FIGURE 4. DISTRIBUTION OF MAJOR LIVESTOCK MARKETS ACROSS ETHIOPIA



Note: This is a high-level mapping. Lower-level mapping would reveal many more routes.

Source: International Livestock Research Institute.

FIGURE 5. MAP SHOWING THE DISTRIBUTION OF LIVESTOCK INFRASTRUCTURE ACROSS ETHIOPIA



Note: This is a high-level mapping. Lower-level mapping would reveal many more routes.

Source: International Livestock Research Institute.

3.2 Kenyan routes, markets and supporting infrastructure

Kenyan livestock routes

Mapping livestock routes across counties in Kenya highlights the complexity of pastoral mobility and the varied conditions of movement corridors. In total, 31,598 km of routes were identified, and classified into major functional, major functional seasonal, major non-functional, minor functional and minor non-functional categories. These classifications reflect both the importance of routes in sustaining livestock mobility and the challenges associated with their functionality (Figure 6).

Of the total mapped routes, 14,925 km (47%) were categorised as major functional routes, indicating corridors that are actively used and remain vital for the regular movement of livestock. Another 4,825 km (15%) were designated as major functional seasonal routes, highlighting the importance of seasonal mobility during dry or wet periods. Meanwhile, 3,424 km (11%) were classified as major non-functional, showing infrastructure or access challenges that limit their use. This represents a significant number of routes that are no longer accessible. Additionally, 8,186 km (26%) were identified as minor functional routes, which provide important more localised mobility options and require further local validation. Only 237 km (1%) were categorised as minor non-functional, representing corridors that have lost viability altogether.

The counties with the most extensive livestock route networks are those in arid and semi-arid lands (ASALs), where pastoralism dominates. Turkana (3,083 km), Garissa (3,071 km), Marsabit (2,982 km), Isiolo (2,727 km), Wajir (2,511 km) and Mandera (2,185 km) together account for nearly half the national total. These counties are heavily dependent on these routes to facilitate seasonal migrations in search of pasture and water. Seasonal routes are particularly prominent in Turkana (1,647 km), Isiolo (792 km), Tana River (456 km) and Marsabit (433 km), reflecting the reliance on flexible grazing strategies tied to climatic variability.

In contrast, counties in central and western Kenya, such as Bungoma, Kakamega, Kisumu, Kericho and Vihiga, recorded relatively smaller networks of routes. These counties are less reliant on large-scale mobility due to the dominance of mixed farming systems, though localised routes remain important for smallholder herders. Coastal counties such as Kilifi, Kwale and Lamu also have substantial route networks, pointing to the role livestock corridors play in linking coastal grazing areas with inland rangelands.

Overall, the data illustrate that livestock mobility in Kenya is highly dependent on functional route networks, particularly in the ASAL counties. While a significant number of corridors remain operational, the presence of over 3,400 km of major non-functional routes indicates growing pressures from land fragmentation, infrastructure development and land use change. Addressing these challenges through route protection, rehabilitation and cross-county planning will be critical to safeguarding pastoral mobility and reducing conflict over resources. As such, it requires urgent attention.

Kenyan livestock markets

Mapping livestock markets across counties in Kenya identified a total of 626 markets, distributed across primary, secondary, border and mixed-function categories. These markets form the backbone of livestock trade and mobility, linking producers to local, national and even cross-border value chains. Most markets, 388 in total, were classified as primary markets, underscoring their central role as the first points of sale where pastoralists and farmers bring animals for trade. In addition, 89 secondary markets were identified, along with a smaller but significant number of border (6) and non-functional (21) markets. Several markets were found to operate under multiple classifications, reflecting the fluid and overlapping nature of Kenya's livestock marketing system (Figure 7).

Counties with the highest concentrations of markets included Mandera (32), Turkana (30), Samburu (37), West Pokot (26), Kitui (29), Makueni (24) and Homa Bay (26). These areas demonstrate both the importance of livestock to local economies and the need for a dense network of markets to support pastoral and agro-pastoral communities. Counties such as Isiolo, Garissa, Marsabit and Wajir also have significant numbers of markets, many of which are strategically located along trade corridors that connect the arid and semi-arid counties to terminal markets in Nairobi, Mombasa and regional hubs. Notably, border markets in Turkana, West Pokot, Marsabit and Lamu highlight the role of cross-border trade with neighbouring Ethiopia, Uganda and Somalia.

The mapping also revealed challenges in market functionality. Non-functional markets (21 in total) were spread across several counties, including Samburu, Kwale, Marsabit and Wajir, often reflecting issues such as insecurity, poor infrastructure, or lack of demand. Furthermore, 100 markets were classified as primary/secondary, while 12 were identified as primary/border and a few as secondary/border or primary/secondary/border, demonstrating how market roles can shift depending on seasonality, trade volumes and connectivity. These overlapping functions emphasise the dynamic nature of livestock trade in Kenya, where markets frequently adapt to meet shifting pastoralist needs and regional trade flows.

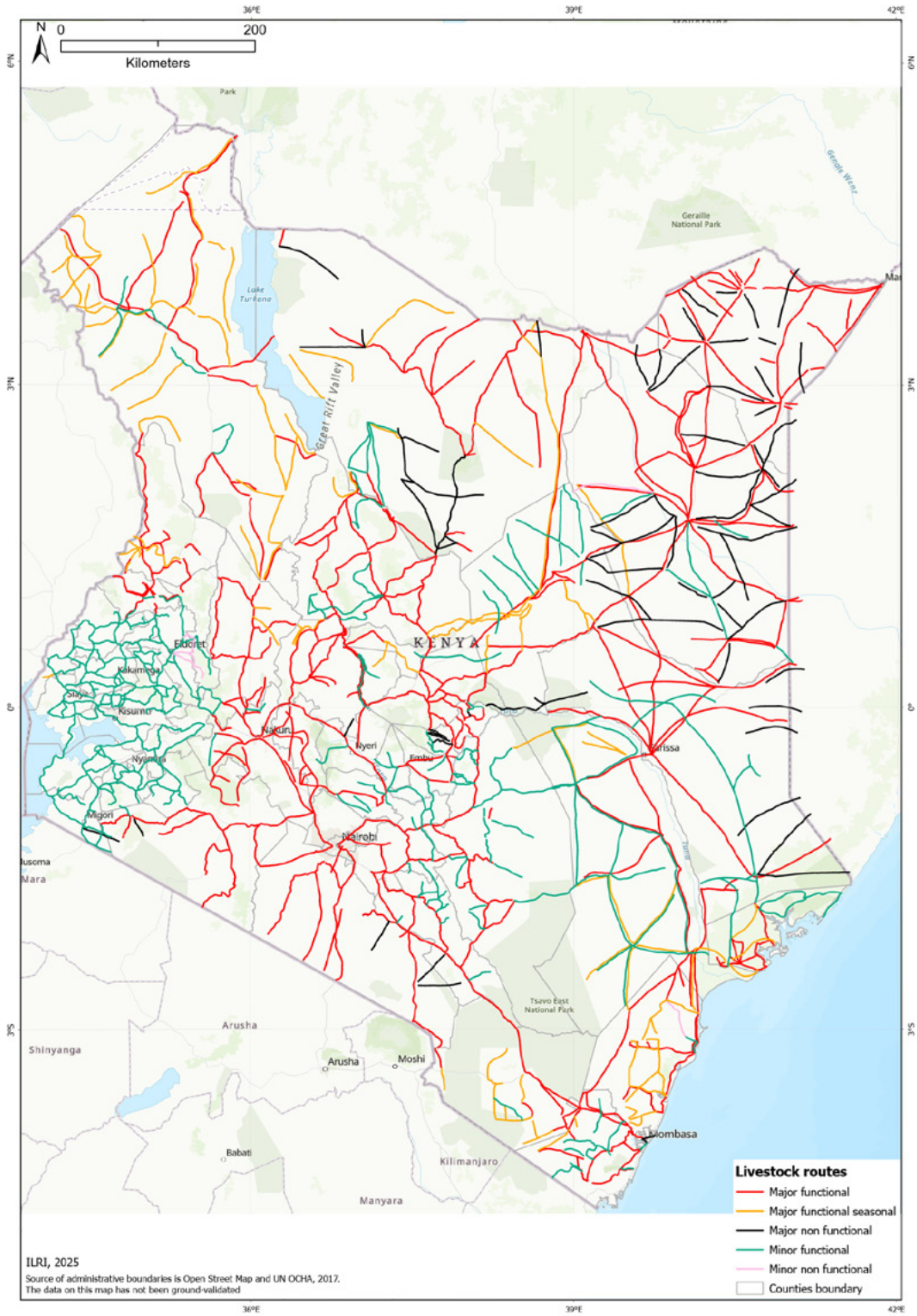
Overall, the analysis highlights that Kenya's livestock marketing system is both diverse and uneven. While counties in pastoral areas have dense networks of functional markets that sustain livelihoods and cross-county trade, other regions face challenges of underuse or market breakdown. Strengthening infrastructure, ensuring security and promoting cross-county and cross-border coordination will be essential to enhance the efficiency of these markets and support the resilience of pastoral economies.

Livestock infrastructure

The mapping of livestock infrastructure across Kenyan counties shows a total of 2,047 facilities, reflecting varied capacities for livestock management, disease control, and market access. The largest share comprises dipping tanks (940 operational and 139 non-operational). Other key infrastructure includes slaughter slabs (411) and slaughterhouses (314), underscoring significant local meat processing activity. Additionally, holding grounds (99 functional and 2 non-functional) and loading/off-loading facilities (57) demonstrate moderate logistical support for animal transport and trade. However, it was said that only six export abattoirs and a single quarantine facility exist nationally, revealing major limitations in facilities required for international livestock trade and disease containment.

According to the participants, infrastructure for animal health and breeding remains limited, with only 41 animal health centres, 5 breeding centres, and 24 vaccine cold chain facilities across all counties – indicating gaps in veterinary and genetic improvement services. The distribution of facilities is uneven, with Uasin Gishu (494 such facilities), Trans-Nzoia (218), and Bungoma (203) counties having the highest concentrations. In contrast, counties such as Nyamira, Siaya, and West Pokot have minimal infrastructure, highlighting regional disparities. These imbalances suggest a strong need for livestock infrastructure investment across the country, and particular investment targeted to the gaps identified.

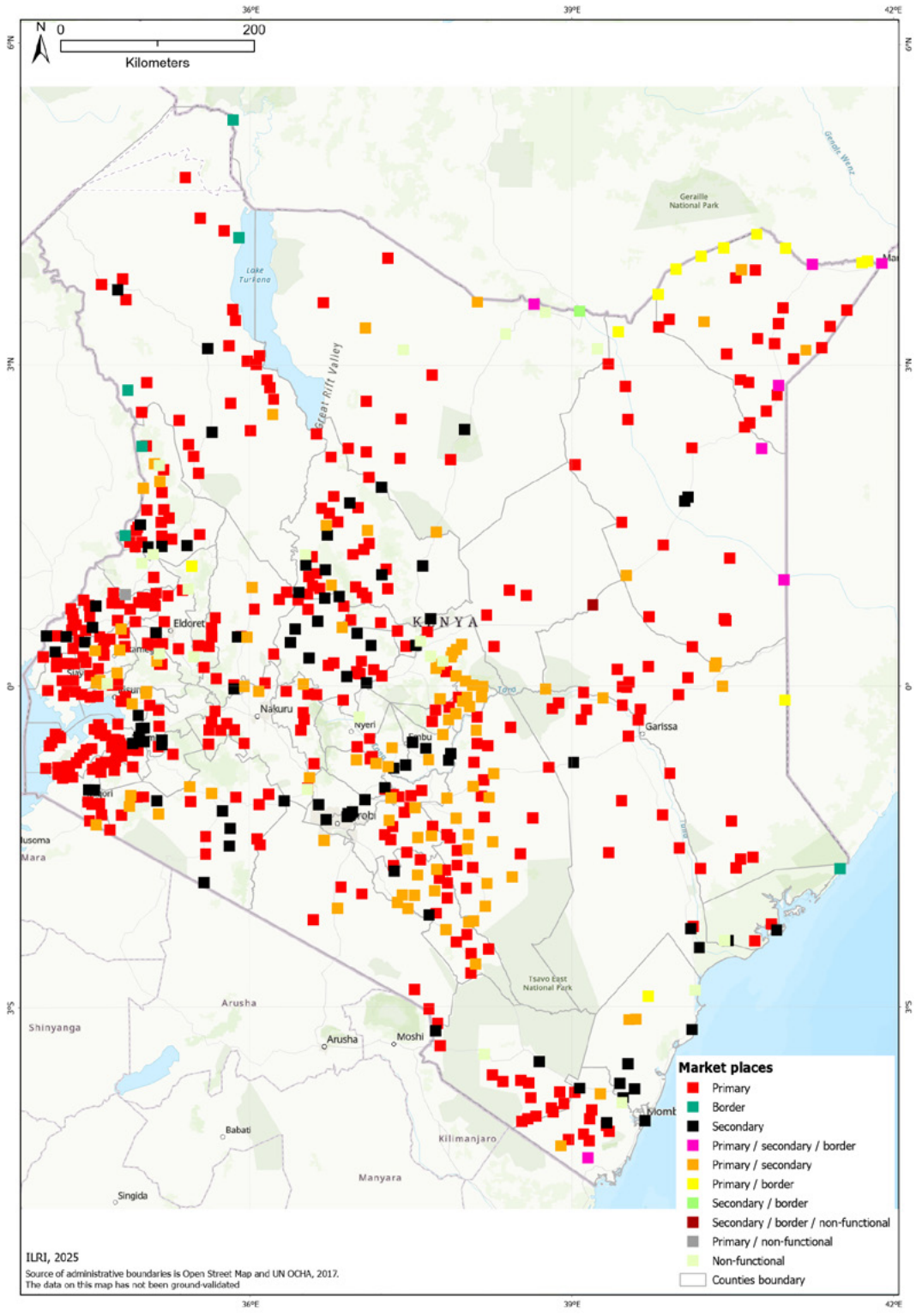
FIGURE 6. MAJOR LIVESTOCK ROUTES ACROSS KENYA



Note: This is a high-level mapping. Lower-level mapping would reveal many more routes.

Source: International Livestock Research Institute.

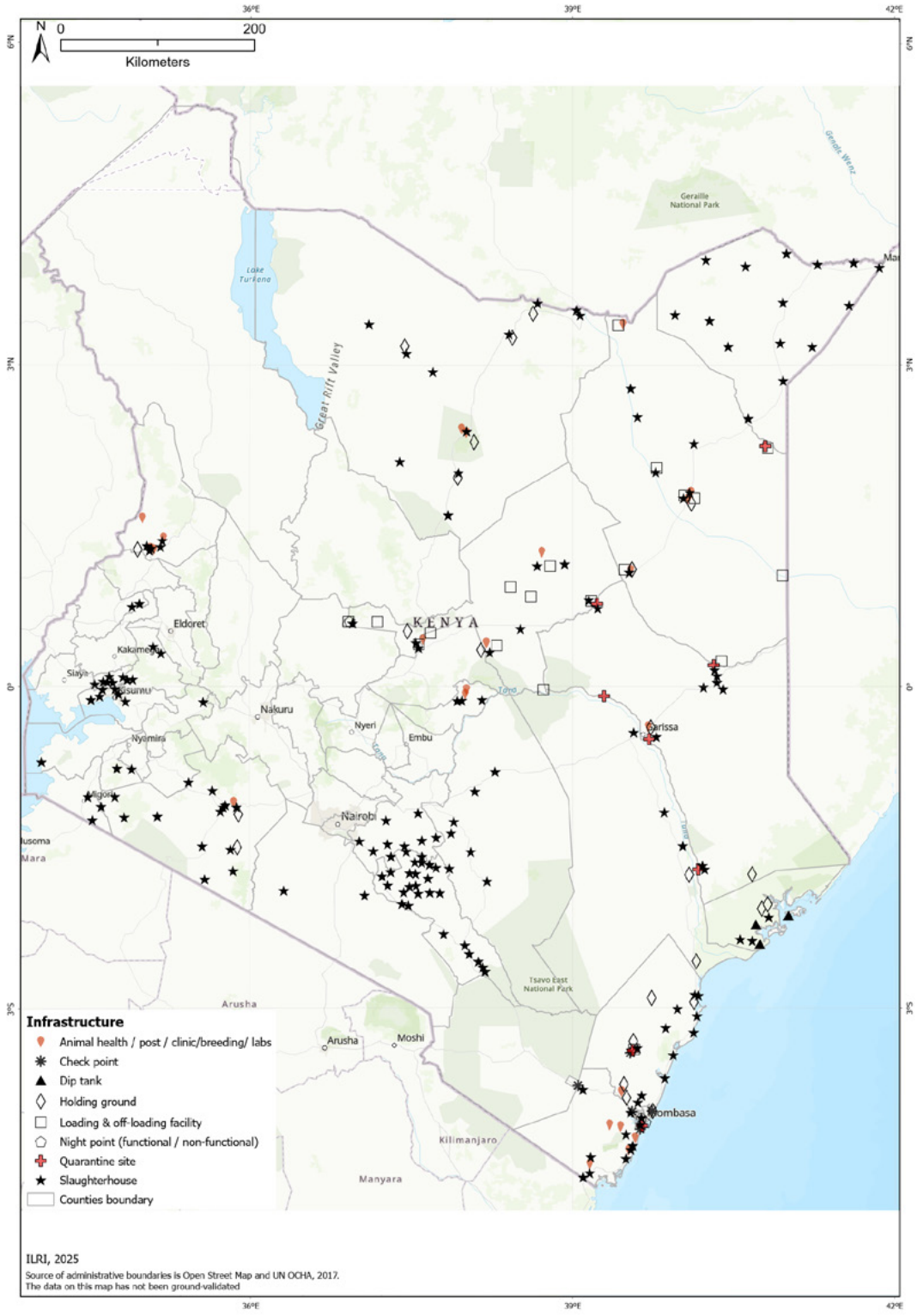
FIGURE 7. DISTRIBUTION OF LIVESTOCK MARKETS ACROSS KENYA



Note: This is a high-level mapping. Lower-level mapping would reveal many more routes.

Source: International Livestock Research Institute.

FIGURE 8. DISTRIBUTION OF LIVESTOCK INFRASTRUCTURE ACROSS KENYA



Note: This is a high-level mapping. Lower-level mapping would reveal many more routes.

Source: International Livestock Research Institute.

4. PASTORALIST MOBILITY AT THE LOCAL LEVEL: CHALLENGES AND RESPONSES

Following the national mapping exercises, case study research was undertaken in locations where the mapping process had identified route blockages. The aim was to understand why routes were blocked and the impact on local communities. Mixed methods were used:

- **Focus group discussions** (FGDs) engaged participants from villages. Discussion groups were separated by gender to capture gendered perspectives on livestock mobility and challenges faced. This participatory approach enabled a rich, context-based understanding of the issues at hand.
- **Key informant interviews** (KIIs) were conducted with community leaders, agricultural experts and representatives from local NGOs to gather expert insights about the broader socioeconomic dynamics affecting pastoralists.
- **Participatory mapping and other tools** involving community members in identifying important rangeland resources and traditional mobility routes allowed for a visual representation of the challenges posed by ecological changes and land use shifts. These visualisations helped communities reflect on the blockages and discuss responses, providing a basis for collective action.

Case studies were undertaken in:

- Bure Mudaiyitu, Amibara, Dulecha and Gewane districts, Afar Region, Ethiopia
- Fentale district, Oromia Region, Ethiopia
- Eldas Constituency, Wajir County, Kenya
- Makueni County, Kenya

The following sections provide a summary of common features and issues, with more details provided on the case studies in Annex 1.

4.1 Context

The pastoral communities in all the case study areas rely heavily on livestock for their livelihoods. Livestock forms the economic backbone of their culture and identity. As a community member from Fentale district, Ethiopia, poignantly stated, 'Our animals are our wealth and our life.'

These communities traditionally engage in migratory practices that allow for effective use of ecological resources, particularly grazing lands. They have rich cultural and historical ties to their land. Livestock serves as a source of food and as a critical economic asset; for many, livestock is synonymous with wealth. The migratory patterns ingrained within these cultures have allowed pastoralists to adapt to seasonal variations and environmental challenges for generations.

However, significant changes have occurred over the past few decades due to land subdivision policies that have transitioned communal lands into private ownership (particularly in Makueni, Kenya), agricultural encroachment into traditional grazing territories, environmental degradation from climate change and invasive species such as *Prosopis juliflora*. Such transitions have fostered competition between different land users, exacerbating tensions and leading to contested grazing spaces.

Community narratives point to declining livestock health as a direct consequence of reduced mobility and access to veterinary services, further complicating the pastoralists' way of life. Livestock populations have significantly shifted, with pastoralists increasingly reliant on resilient small ruminants like goats and sheep. As one member said, 'The goats and sheep are our safe bets; they provide us with income and are easier to manage during hard times.'

Though the context and history of each case study is somewhat different, the challenges and responses are similar. This points to common entry points for coordinated and cross-country policy change and action.

4.2 Challenges

The challenges expressed by those interviewed are multifaceted yet common across the four case studies. These include:

Environmental degradation

The quality of grazing areas and consistent access to livestock pathways has been impacted both by climatic changes and by invasive species. Prolonged droughts and erratic rainfall patterns are devastating pastoral lands, forcing herders to adapt to increasingly difficult conditions. In addition, the rapid spread of invasive plants like *Prosopis juliflora* has been notable in all the case study sites. This hinders access and diminishes the quality of the remaining forage, impacting livestock health. In Afar, herders lament that '*Prosopis* has taken over many grazing areas, impacting not just our animals but our way of life.' Another said: 'Every year, *Prosopis* takes more of the area where we used to graze. It blocks the paths.' *Prosopis juliflora* was the most mentioned invasive species; however, others such as *Lantana camara, Parthenium hysterophorus* and *Opuntia* spp. are also said to be causing problems.

Land use conflicts

As agricultural practices expand into traditional grazing areas, the competition for land between farmers and pastoralists has intensified. Participants in the Eldas, Kenya, study noted: 'The new farmers do not understand our needs; they only see the crops they want to grow.' Pastoralists have historically navigated these landscapes through seasonal rotations, but the alteration of land use leaves them with fewer options, elevating tensions between communities. Disputes over access to resources were mentioned in all study areas, including in Ethiopia, where, until the last two to three years, they had been mainly absent. The inability to share resources peacefully leads to further destabilisation within communities.

Governance and policy issues

Traditional governance structures that historically managed common resources and resolved disputes are weakening. This exacerbates tensions and complicates dispute resolution. A participant from Fentale district, Ethiopia, noted the loss of communal decision-making: 'We used to have community meetings to make decisions together; now it feels like everyone is out for themselves.'

Furthermore, the lack of formal policies recognising pastoral mobility routes amplifies the vulnerabilities faced by these communities, as highlighted by one pastoralist also in Fentale: 'Without a law to protect our routes, we are vulnerable to losing everything.'

Socioeconomic pressures

The disruptions to mobility have economic repercussions, as families are often forced to sell livestock at lower prices. The decline in livestock health due to reduced mobility and access to veterinary services has further strained household economies. A community member said, 'We sold livestock at throwaway prices and still couldn't feed our families.'

Gendered impacts

The study revealed a gender divide in the experiences of pastoralists, illustrating how men and women face different challenges and employ various coping strategies in response to mobility disruptions. While men highlight negotiating new routes, women emphasise communal action and collective resilience.

4.3 Community responses to challenges

Communities across the study areas have exhibited resilience through various adaptive strategies:

Changing routes and negotiating access

Pastoralists must find new routes to move their livestock to avoid farmers' fields or other blockages. In Eldas, Kenya, for example, pastoralists have begun using longer, less accessible routes to navigate the blockages. One elder said, 'Mobility is part of our life. When one path is blocked, everyone's pattern is disturbed.' Communities are also finding new ways to negotiate and advocate for their mobility rights, displaying a shift toward proactive engagement.

Diversification of livestock and livelihoods

Communities have shown resilience by diversifying livestock ownership, focusing on smaller ruminants that require fewer resources and engaging in small-scale farming alongside traditional pastoralism. In Fentale, Ethiopia, families are increasingly combining pastoralism with small-scale farming: 'It's not just about herding animals anymore; we are all trying to farm where we can,' said one community member. This approach can provide a safety net against the risks of livestock losses, yet farming is also a risky business and will also fail in times of drought. Additionally, more land converted to crop farming will lead to more mobility challenges.

Community cohesion and collective action

There has been an emergence of community groups aimed at resource management and knowledge sharing. A focal point in many discussions has been the unified approach towards managing invasive species after recognising them as a shared threat: 'We all agree: *Prosopis* must be removed if we hope to restore our lands and lives.' An elder from Fentale said, 'Together we can figure out how to deal with *Prosopis* and find new ways to move when traditional paths are blocked.'

There have also been some shifts in gendered decision-making. Increasingly, women are being incorporated into discussions concerning resource management. A participant from Eldas highlighted this evolution, saying, 'For the past 10 years, men would sell part of the livestock only, but now discussions involve both men and women.' The shift toward inclusivity enhances community cohesion and resilience.

Advocacy for legal recognition

In times of conflict, pastoralists increasingly appeal to elders and local leaders for negotiation. Increasing participation in advocacy for their rights signifies a shift towards proactive engagement by community members. Community dialogues underscored a strong desire for formal policies that protect traditional livestock routes and grazing rights. As noted above, members said, 'Without a law to protect our routes, we are vulnerable to losing everything.' This call for legal recognition reflects the urgency of restoring secure access to traditional grazing lands and requires a response from national governments and regional bodies such as IGAD.

4.4 Conclusion

The case studies emphasise the critical need for integrated approaches that address the multifaceted challenges faced by pastoral communities. The findings from the case studies illustrate a clear link between the breakdown of traditional mobility and the erosion of both social and economic security among these communities. As one community elder said, 'If we restore the paths, we restore our lives.'

Community resilience is intrinsically tied to both the empowerment of individuals and collaborative action, fostering a fabric of unity necessary to adapt and mitigate adverse impacts. The collective responses highlight a resilience that, while strained, strives for adaptation and survival. Holistic strategies that incorporate traditional knowledge, legal protections for mobility and sustainable management practices are essential for enhancing the resilience and livelihoods of pastoral communities in regions affected by these challenges. This needs collaborative effort involving local communities, government actors and NGOs to

develop solutions that are sensitive to the traditional lifestyles of pastoralists while addressing the urgent environmental and economic challenges they face.

4.5 Recommendations

The following recommendations are offered based on the information gathered during the case studies:

- **Establish legal frameworks.** Formal legal recognition of traditional grazing routes through policy and legislation is essential to protect community rights against encroachment. Governments should adopt policies that acknowledge and support pastoralist practices. Regional bodies such as IGAD can promote the development and harmonisation of such policies, which will also facilitate cross-border movement and trade.

- **Promote participatory rangeland management and collective action for dealing with invasive species.** Integrating local knowledge into environmental management strategies can mitigate the adverse effects of invasive species and promote sustainable land practices. Processes such as participatory rangeland management can provide an appropriate framework for this and require investment (ICPALD, 2024; Flintan and Cullis, 2010). Invasive species require a coordinated and large-scale intervention with long-term funding to ensure the land is managed well after clearance to prevent reinfestation.

- **Give urgent attention to invasive species.** The problem of invasive species has been highlighted in all four case studies. Responding to this problem is beyond the capacity of local communities and requires significant external investment and multi-stakeholder collective action. This is an absolute action priority needed to facilitate mobility and restore the productivity of lands lost.

- **Revitalise community governance structures.** Continued emphasis on community organising will serve to enhance collaborative responses to immediate challenges while fostering social cohesion. Restoring traditional governance systems is vital in allowing collective decision-making processes to regain strength. Such structures foster unity and facilitate conflict resolution.

- **Encourage gender inclusivity.** Policies must reflect the complexities of gender dynamics within pastoral communities, ensuring that women's voices are integral in resource management discussions.

5. OVERALL CONCLUSION

Mobility in pastoralism in the Horn of Africa is paramount for the survival and livelihood of livestock-producing communities, particularly pastoralists. Mobility allows pastoralists to access critical resources such as water and grazing areas across arid and semi-arid landscapes. This facilitates the well-being of livestock and secures the economic stability of those dependent on livestock production. It is fundamentally woven into the social fabric and identity of pastoral communities, supporting cultural practices, social ties and resilience amidst environmental variability.

5.1 Status of livestock routes' functionality

In Ethiopia, the status of livestock routes is quite varied, reflecting a diverse yet uneven distribution that signals potential challenges. The country has approximately 25,504 km of mapped livestock routes, categorised into major functional, minor functional and non-functional types. Notably, Oromia Region has the highest number of active routes, making it essential for livestock mobility within the country. However, significant concerns arise from the extent of non-functional routes. Over 382 km are classified as non-functional due to urban expansion, agricultural encroachment and invasive species, particularly *Prosopis juliflora*.

In Kenya, the network of livestock routes spans about 31,598 km. Most of these routes (14,925 km) are categorised as major functional, indicating their active use for livestock movement. Despite this, over 3,400 km are classified as major non-functional, highlighting similar challenges to those faced in Ethiopia, with a significant spread of invasive species and land use changes impacting the pastoral mobility that communities historically relied upon. These blocked or unusable livestock corridors result in heightened competition for grazing lands.

5.2 Mobility challenges

The challenges faced by pastoral communities in Ethiopia and Kenya due to disrupted mobility pathways are significant. In Ethiopia, individualisation of land has led to restricted access to communal lands, culminating in increased disputes over grazing resources. Similarly, despite the potential of the Community Land Act 2016 in Kenya, the encroachment of agricultural land into traditional grazing areas has intensified competition between pastoralists and farmers. This land use change reduces the space available for livestock mobility, directly affecting livelihoods. Additionally, governance fragmentation, characterised by weakened traditional leadership structures, exacerbates disputes over land use, making it challenging for communities to resolve conflicts amicably.

5.3 Community responses

Faced with these mobility challenges, communities in both countries have demonstrated resilience and adaptability. Community members must take alternative routes to navigate blocked pathways. In some regions, diversification of livelihoods has become more common. Pastoralists are increasingly integrating small-scale agriculture alongside traditional herding practices; however, the more rangeland is converted to cropping land, the more mobility will be restricted.

On a positive note, there has been increasing engagement in collective action within communities. The restructuring of groups focused on resource management signifies a renewed emphasis on proactive governance within pastoral communities. Initiatives aimed at addressing invasive species collaboratively have emerged, reflecting a shared understanding of communal risks. These require investment and implementation at scale.

In conclusion, the mobility of pastoral communities in the Horn of Africa is a vital aspect of their cultural, economic and social existence. By implementing focused policies and collaborating with pastoral communities, stakeholders can help ensure that the livelihoods and cultural heritage of these vulnerable groups are sustained for generations to come. The resilience of pastoralists is not just about enduring harsh conditions; it is rooted in their intricate connections to the land, culture and community, emphasising that restoring the routes is synonymous with restoring their way of life.

6. POLICY RECOMMENDATIONS

To safeguard pastoral mobility systems and strengthen the resilience and economic potential of pastoral communities in the Horn of Africa, urgent and coordinated policy action is required. The findings of this study highlight both the opportunities and the risks: without clear protection, investment, and governance, critical livestock corridors will continue to degrade – undermining livelihoods, food security and regional stability. The following recommendations outline concrete actions for governments, IGAD and development partners:

Legal recognition of livestock routes

Both Ethiopia and Kenya should prioritise enacting formal legal frameworks that recognise traditional livestock routes. Such formal recognition would serve to protect these vital pathways from encroachment and degradation, land conversion, and infrastructure developments that obstruct pastoral movement. Legal protection should be complemented by clear enforcement mechanisms and integration into land-use planning and tenure systems.

Establishment of a livestock information system (LIS)

Building on the datasets and maps produced through this initiative, governments should develop a comprehensive livestock information system to monitor route functionality, infrastructure conditions and seasonal access. The LIS should serve as a central decision-support tool for integrating pastoral mobility into national land use planning, climate adaptation strategies and regional trade frameworks. It should be housed within a competent government institution, with collaboration from IGAD, research organisations and private sector partners for data management and dissemination.

Expand and deepen mapping of livestock corridors

The current national-level maps provide a strong foundation, but finer-scale mapping is essential to capture local-level realities, including routes around major markets, water points and grazing zones. Governments, supported by IGAD and partners, should institutionalise regular mapping exercises that update information on route status and functionality, feeding directly into the LIS. This will ensure a dynamic, living database that supports planning, policy and investment decisions.

Infrastructure development

Governments and development partners must invest in well-planned and climate-resilient livestock infrastructure along key routes – including water points, veterinary facilities, resting areas and quarantine stations. Investments should be guided by spatial analysis from the mapping exercise to ensure optimal placement at convergence points and high-traffic corridors. Such infrastructure will directly improve livestock health, reduce losses and enhance the competitiveness of the livestock sector.

Strengthen community-based governance and conflict resolution

Community institutions are central to sustainable management of mobility corridors. Strengthening traditional governance systems and integrating them into formal decision-making processes will enhance accountability, reduce conflicts and ensure equitable access to rangeland resources. Support should focus on capacity building, inclusive decision-making, and recognition of customary authorities in route and rangeland governance.

Promote cross-sectoral and cross-border collaboration

Governments should establish multi-sectoral coordination mechanisms that bring together ministries responsible for livestock, environment, land, infrastructure and trade to align policies affecting pastoral mobility. Similarly, cross-border coordination frameworks should be strengthened to align national policies with regional mobility and trade objectives. Partnerships among government, NGOs and pastoral associations will be key to ensuring coherence between pastoral and agricultural land uses.

Institutionalise participatory mapping and knowledge sharing

Engaging pastoralist communities in the ongoing participatory mapping of livestock routes and grazing areas ensures local ownership and long-term sustainability. Such participatory processes not only validate route data but also empower communities to monitor and protect their own mobility corridors. Regular updates should be built into local development planning cycles and shared through regional knowledge platforms.

Strengthen IGAD's leadership in regional harmonisation

IGAD and its specialised agency, ICPALD, have a pivotal role in driving the regional harmonisation of national actions under the Transhumance Protocol. IGAD should encourage all member states to undertake similar mapping and protection of livestock routes, provide technical guidance for planning and servicing corridors, and mobilise significant regional investment for implementation. Regional coordination will ensure that pastoral mobility systems function seamlessly across borders – advancing the Transhumance Protocol goals of free movement, trade integration and resilience.

These actions are essential not only to protect livestock routes but also to secure the economic and ecological foundations of the pastoral system. Strengthening policy, legal, and institutional frameworks around mobility will be critical for climate adaptation, regional integration and long-term stability in the Horn of Africa.

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ANNEX 1: LIST OF FACILITATORS AND PARTICIPANTS

TABLE A1. ETHIOPIA FACILITATION TEAM

	Facilitator name	Institution	Position
1	Bedasa Eba	ILRI Addis	Research officer and range ecologist
2	Yasin Getahun	ILRI Addis	GIS expert
3	Eskatnaf Getachew	ILRI Addis	Assistant to project manager
4	Julius Muyizzi	ICPALD	GIS & remote sensing officer
5	Dr. Mohammed Yahya Said	ILRI Consultant	System ecologist with expertise in participatory mapping, spatial modelling, integrated landscape analysis and extensive experience in facilitating multi-stakeholder processes

Source: authors' own.

TABLE A2. ETHIOPIA PARTICIPANTS

	Participant name	Region	Expertise	Institution
1	Dr. Berhanu Alemayehu	Southwest Ethiopia	Animal health	Regional Livestock and Fishery Bureau
2	Gizachew Tazeb	Southwest Ethiopia	Animal science	Regional Bureau of Agriculture
3	Mesfin Mokonen	Afar/Semera	GIS	Afar Land Bureau
4	Hagi Mohammed	Afar/Semera	GIS	Afar Land Bureau
5	Abdu Seid Hassen	Afar/Semera	GIS	Agriculture and Natural Resource Bureau
6	Dr. Seid Ahmed	Afar/Semera	Animal health	Livestock and Fishery Resource Development Bureau
7	Jemal Ahmed	Afar/Semera	Livestock production	Livestock and Fishery Resource Development Bureau
8	Omod Okongo	Gambella	Animal science	Livestock and Fishery Bureau
9	Fasil Weretaw	Gambella	Veterinary	Livestock and Fishery Bureau

	Participant name	Region	Expertise	Institution
10	Dr. Pilual Nyoch	Gambella	Animal health	Livestock and Fishery Bureau
11	Hailu Yirga	Benishangul/Assosa	Animal production	Livestock and Fishery office
12	Ayansa Waqijira	Benshangul/Assosa	Livestock production	Livestock and Fishery office
13	Dr. Issa Abdujebar	Harari	Animal health	Agriculture Bureau
14	Tesfaye G/ maryam	Tigray/Mekelle	Animal health	Bureau of Agriculture and Rural Development
15	Alem Abraha	Tigray/Mekelle	Marketing	Bureau of Agriculture and Rural Development
16	Mohammed Abdi Oumer	Somali/Dire Dawa	Agricultural economist	Pastoral Development Bureau
17	Abdikadar Shukri	Somali/Jijiga	Livestock marketing/ GIS	Pastoral Development Bureau
18	Mohamud Abdulahi Mohammed	Somali/Jijiga	Livestock production	Pastoral Development Bureau
19	Muse Shek Abdi	Somali/Jijiga	Animal science	Pastoral Development Bureau
20	Dr. Bashir Ahmed Mehamed	Somali/Jijiga	Animal health	Pastoral Development Bureau
21	Abdirahman Mahamoud	Somali/Jijiga	Livestock production and pastoral development	Pastoral Development Bureau
22	Dr. Eskendir Kedir	South Ethiopia	Animal health	Regional Livestock Office
23	Zarihun Janje	Sidama Region/ Hawassa	Animal science	Regional Livestock Office
24	Dr. Kasaye Berhe	Sidama Region/ Hawassa	Animal health	Regional Livestock Office
25	Tilahun Mekonen	Benshangul	Animal health	Livestock and Fishery office
26	Demelash Ayechile	Amhara/Bahirdar	Animal production	Regional Livestock Office
27	Mequanint Damtie	Amhara/Bahirdar	Livestock production	Regional Livestock Office
28	Birneh Tesfaye	Central Ethiopia	Animal and rangeland	Regional Livestock Office
29	Mussa Alewi	Central Ethiopia	Dairy	Regional Livestock Office

	Participant name	Region	Expertise	Institution
30	Hamedu Ali Hamedu	Afar Livestock Bureau	Rural development	Regional Livestock Bureau
31	Dr. Misganaw Mulugeta	South Ethiopia	Animal health	Livestock Bureau
32	Dinke Keneni	Oromia Bureau of Agriculture	Animal production	Livestock and Fishery office
33	Sultan Hussien	Oromia Bureau of Agriculture	Animal production	Livestock and Fishery office
34	Mulugeta Asefa	Oromia Bureau of Agriculture	Animal production	Livestock and Fishery office
35	Mamo Gobena	Oromia Bureau of Agriculture	Animal science	Livestock and Fishery office
36	Aklilu Busawa	Pastoralist Office of Oromia	Rural development	Pastoral and Irrigation Bureau
37	Musa Kedir	Oromia Bureau of Agriculture	Animal science	Livestock and Fishery office
39	Gebeyehu Belachew	Ministry of Agriculture	Animal science	State Ministry of Livestock and Fishery Development
40	Girma Mulugeta	Ministry of Agriculture	–	State Ministry of Livestock and Fishery Development
41	Chane Gebeyhu	Ministry of Irrigation and Lowland	–	Ministry of Irrigation and Lowland

Source: authors' own.

TABLE A3. KENYA FACILITATION TEAM

	Facilitator Name	Institution	Position
1	Irene Nganga	ILRI Nairobi	Research associate
2	Yasin Getahun	ILRI Addis	GIS expert
3	Beth Njoroge	ILRI Nairobi	Programme administrative assistant
4	Polycarp Onyango	ILRI Nairobi	Communications
5	Julius Muyizzi	ICPALD	GIS and remote sensing officer
6	Blaise Okinyi	State Department of Livestock, Kenya	Range management and resources specialist
7	Frederick Aloo	State Department of Livestock, Kenya	Range management specialist
8	Japheth Kasimbu	ICPALD	Project coordinator – transhumance
9	Shem Kifugo	PhD Student, University of Groningen	GIS and participatory mapping

	Facilitator Name	Institution	Position
10	Dr. Mohammed Yahya Said	ILRI Consultant and Lead Facilitator	System ecologist with expertise in participatory mapping, spatial modelling, integrated landscape analysis and extensive experience in facilitating multi-stakeholder processes

Source: authors' own.

TABLE A4. KENYA PARTICIPANTS

	Name	County	Job title	Department
1	Peter Mwangi Mwai	Laikipia	County Director Veterinary Services	Veterinary
2	Henry Dundo	Siaya	Principal Livestock Production Officer	Livestock
3	Patrick Mweni	Kilifi	Senior Livestock Production Officer	Livestock
4	Kenneth Ochola	Lamu	County Director Livestock Production	Livestock
5	Samuel Ndao	Kwale	County Director Livestock Production	Livestock
6	Nzioka Wambua	Tana River	County Director Livestock Production	Livestock
7	Martin Oyindo	Taita Taveta	Assistant Director Livestock Production	Livestock
8	Abraham Kiptanui	Uasin Gishu	County Director Livestock Production	Livestock
9	Richard Bundotich	Baringo	County Director Livestock Production	Livestock
10	William Bore	Elgeyo-Marakwet	County Director of Livestock Production	Livestock
11a	Amos Lekukuu	Samburu	Veterinary Officer	Veterinary
11b	Joseph Kilonzo	Samburu	County Director of Livestock Production	Livestock
12a	Peter Tache Golicha	Marsabit	Livestock Officer	Livestock
12b	Edward Lentoror	Marsabit	Sub-County Livestock Production Officer	Livestock
13	Evans Mwiti Mathiu	Meru	Deputy Director Livestock Production	Livestock
14a	Benard Ouma	Wajir	Deputy Director Livestock Production	Livestock
14b	Abdinoor I. Musa	Wajir	Deputy Director Agriculture	Livestock

	Name	County	Job title	Department
15	Hussein Madey	Mandera	County Director Livestock Production	Livestock
16a	Eric Ahenda	Kajiado	County Director Livestock Production	Livestock
16b	John Kolei	Kajiado	Livestock Production Officer	Livestock
17	Jamin Kipkogei	Narok	Assistant Director Livestock Production	Livestock
18	Josephat Maluki	Kitui	County Director Livestock Production	Livestock
19	Joseph Musyoka	Machakos	County Director Livestock Production	Livestock
20	David Musyoki	Makueni	County Director Livestock Production	Range management
21	Justus Gicovi	Mombasa	Deputy County Director Livestock Production	Livestock
22	Michael Cheruiyot	Kericho	County Director Livestock Production	Livestock
23	Robert Wakoli	Nandi	County Director Livestock Production	Livestock
24	Evans Kiplagat	Bomet	County Director Livestock Production	Livestock
25	Edward Ondigi	Nyamira	County Director Livestock Production	Livestock
26	Dickson Okello Chaulo	Isiolo	County Director Livestock Production	Livestock
27a	Bobby Ekadon	Turkana	County Director Livestock Production	Livestock
27b	John Eipa	Turkana	Deputy Director Livestock Production	Range management
28	Mary Situma	Bungoma	County Director Livestock Production	Livestock
29	David Mukabane	Busia	County Director Livestock Production	Livestock
30	Henry Odanga	Kakamega	County Director Livestock Production	Livestock
31	Harisson Were	Trans-Nzoia	County Director Livestock Production	Livestock
32	Caroline Misiko	West Pokot	Livestock Production Officer	Livestock
33a	Eric Mwatuni	Garissa	State Department of Livestock Production	Livestock

	Name	County	Job title	Department
33b	Haret Hambe	Garissa	County Director Livestock Production	Veterinary
34	Margaret Ndumia	Nairobi	County Director Livestock Production	Livestock
35	Anthony Gichuki	Kiambu	Assistant Director Livestock Production	Livestock
36	Vincent Muohi	Murang'a	County Director Livestock Production	Livestock
37	Teresia Ndung'u	Nyandarua	County Director Livestock Production	Livestock
38	Jane Njuguna	Nyeri	County Director Livestock Production	Livestock
39	Stephen Musyoka	Embu	County Director Livestock Production	Livestock
40	Benard Wanjohi	Kirinyaga	County Director Livestock Production	Livestock
41	James Kimathi	Tharaka-Nithi	County Director of Veterinary Services	Veterinary
42	Henry Anjila	Vihiga	Assistant Director Livestock Production	Livestock
43	Damaris Amolo	Homabay	County Director Livestock Production	Livestock
44	Peter Ogutu	Kisumu	Assistant Director Livestock Production	Livestock
45	Charles Ogechi	Migori	County Director Livestock Production	Livestock
46	Virginia Ngunjiri	Nakuru	County Director Livestock Production	Livestock
47	Kennedy Osoro	Kisii	County Director Livestock Production	Livestock

Source: authors's own.

ANNEX 2: SUMMARIES OF CASE STUDIES

Case study 1: *Prosopis juliflora* invasion in Afar region, Ethiopia

Ambica Paliwal and Yasin Getahun

The invasion of *Prosopis juliflora* represents a significant ecological and socioeconomic challenge for pastoral communities in the Afar region of Ethiopia. A study was carried out in four Afar districts: Bure Mudaiyitu, Amibara, Dulecha and Gewane. Given its arid climate and reliance on livestock mobility, the Afar region was chosen for its critical vulnerability to the effects of *Prosopis* invasion. The region supports pastoral communities who are heavily dependent on seasonal migrations to access scarce resources.

The study sought to understand the spatial extent and temporal changes of *Prosopis juliflora*, the impacts of this on access to vital pastoral resources such as water and grazing land and the concomitant shifts in pastoral mobility patterns and coping strategies with a focus on gender disparities. Data collection techniques included:

- presence–absence data of *Prosopis juliflora*, gathered through random sampling: a total of 200 georeferenced records were collected during the species's peak growth period
- focus group discussions organised separately for men and women to capture a gendered understanding of the invasion's impacts. High-resolution maps were provided, enabling participants to identify blocked routes and resource areas affected by *Prosopis*
- local leaders, community elders and extension workers provided contextual insights on the spread and management of *Prosopis juliflora*
- multispectral imagery from Sentinel-2 and PlanetScope was utilised to quantify spread and temporal dynamics.

The following key findings detail the widespread impact of the species on local livelihoods, specifically through the lens of community perspectives, highlighting gendered experiences and communal coping strategies.

Spatial and temporal dynamics of invasion

The study found a marked increase in the density and spatial coverage of *Prosopis juliflora* over time, particularly near key pastoral resources such as rivers, water points and livestock routes. The use of satellite imagery effectively captured the temporal dynamics of this invasive species, revealing a pattern of expansion that corresponds with its affinity for moisture and the facilitation of its seed dispersal by livestock. This is supported by community perspectives: 'Every year, *Prosopis* takes more of the area we used to graze. It blocks the paths, especially near the rivers where we fetch water for our livestock,' noted a local herder.

Gendered perspectives on impacts

The study revealed distinct differences in how men and women experience and respond to the invasion. Engaging in focus group discussions, men highlighted the challenges of mobility: 'Our herding routes have been blocked. Where we would traditionally move freely, now we find thickets of *Prosopis*,' said one male participant.

This reflects men's traditional role in long-distance herding and resource management and their concerns about reduced grazing availability and access to water points.

In contrast, women provided insights linked to household and direct community impact, emphasising the increased labour burdens and risks they face due to blocked access to the water sources and safe routes they need for daily tasks. Experiences of physical injury from thorns and wildlife encounters amid dense *Prosopis* stands were notable points of concern. 'It is harder for us to collect water; we have to walk further and face more dangers. Sometimes, it takes all day just to fetch enough for our families,' reported a female community member.

Coping strategies and community resilience

Both men and women revealed varied coping strategies in response to the challenges posed by *Prosopis juliflora*, highlighting a duality in response mechanisms, with men focusing on negotiation and women emphasising cooperation. Men tended to focus on negotiating new herding routes while seeking to assert traditional rights to unblocked paths: 'We talk among ourselves to find new ways to move our cattle, but it adds stress and cost to our journeys,' a male leader stated. Conversely, women described communal action and adaptation: 'We often work together to share what we have and find ways to support each other in accessing clean water,' said a woman involved in a local women's group.

Shared understanding of threat

Despite the differences in experiences, there is a recognised consensus on *Prosopis* as a common threat to pastoral livelihoods. Community mapping exercises revealed that both men and women identified significant overlaps in regions affected by the invasion. This shared acknowledgement has catalysed a unified call for intervention. A participant from the women's focus group concluded: 'We all agree: *Prosopis* must be removed if we hope to restore our lands and lives.' This convergence not only illustrates the ecological implications of *Prosopis* invasion but also serves as a basis for collaborative action towards effective management strategies.

Conclusion

The findings from the report provide a clear picture of the multifaceted impacts of *Prosopis juliflora* on Afar's pastoral communities. The gendered dimensions of resource access and management underscore the need for inclusive strategies that cater to the diverse experiences of both men and women in these regions. The urgency of coordinated removal efforts is emphasised by the profound recognition across the community of *Prosopis* as a significant barrier to sustainable pastoralism in the Afar Region.

In synthesising these community insights, this case study advocates for holistic management strategies that incorporate local knowledge and address the socio-ecological intricacies presented by *Prosopis juliflora* invasion.

Case study 2: Mobility blockages for pastoralists from Fentale district, Oromia Region, Ethiopia

Bedasa Eba

Fentale district, located in the Oromia Region of Ethiopia, is primarily inhabited by pastoralists and agro-pastoralists who depend on livestock for their livelihoods. The area has undergone significant changes in recent years due to environmental challenges, socioeconomic pressures and shifts in land use patterns. This study explores these changes, focusing on livestock mobility, the challenges herders face and the community's responses. Insights from community members highlight the profound effects of these changes on their way of life.

Research methodologies included:

- focus group discussions among 18 people from different villages, which included participatory mapping of rangeland resources and mobility, trend analysis and problem tree analysis. Separate discussions were held for men and women
- key informant interviews with e.g. community leaders, a district agricultural expert and a local NGO representative
- quantitative data collected from local government offices.

Livestock as the backbone of livelihoods

In Fentale, a significant portion of the population relies on livestock for sustenance and economic activities. The community comprises roughly 70% pastoralists, part of a socioeconomic structure that revolves around the ownership and management of livestock. 'Our animals are our wealth and our life,' noted one community member, underscoring the centrality of livestock to their identity and economy.

Over generations, pastoralists have developed intricate knowledge about animal husbandry, mobility patterns and grazing areas. The prevalent livestock in Fentale includes goats, sheep, camels and cattle, with goats emerging as particularly resilient to current environmental changes. As a local elder stated, 'Goats can survive in conditions where cattle struggle, making them increasingly important as the climate changes.' However, significant shifts in livestock demographics have occurred over the years, with reports indicating a decline in cattle populations due to various stressors including drought.

Environmental factors impacting livestock mobility

The community has observed pronounced environmental changes that directly affect livestock health and mobility. Factors such as prolonged droughts, invasive plant species like *Prosopis juliflora* and land degradation have severely impacted rangeland availability. One herder lamented: 'Grass is becoming scarce; in the past, there was always enough fodder, but now we have to travel far.'

Prosopis juliflora's aggressive spread has been particularly alarming, as it displaces native grasses and restricts access to traditional grazing routes. This invasive species has created more challenges for pastoralists, as the once-rich and -varied grazing lands are now dominated by this hardy, yet generally unpalatable plant. As a community member said, '*Prosopis* has taken over many grazing areas, impacting not just our animals but our way of life.'

Challenges of blocked livestock routes

The reduction in viable grazing areas has led to the blockage of traditional livestock movement routes. Pastoralists have historically relied on these pathways to migrate with their herds in search of food and water. This limitation has resulted in longer travel distances, often exacerbating the stress on livestock and reducing their overall health. A community member recounted their frustrations, stating 'We can no longer use the old routes.... *Prosopis* and farming activities have locked us in.'

Moreover, with streams of migration routes becoming increasingly disrupted, the economic implications are significant. The inability to access markets with ease puts additional pressure on pastoralists, forcing them into a corner economically. Another villager explained: 'When we take longer routes, we miss opportunities to sell our animals; it affects our income and well-being.'

Increasing tensions between pastoralists and farmers

As agricultural land has expanded into traditional grazing territories, tensions between farmers and agro-/pastoralists have intensified. With encroaching farmland, conflicts over land and resources have become common. A pastoralist reflected on this shift: 'The new farmers do not understand our needs; they only see the crops they want to grow.'

The competition for land and resources has been a source of discord, as pastoralists and farmers find themselves in disputes over access to critical grazing areas. Community elders, once respected for their roles in mediating conflicts, find themselves challenged by the complexities of modern land use. 'In the past, we had harmony; we shared our land and resources. Now, we are often at odds,' a local elder remarked, illustrating the changing social dynamics.

The decline of traditional governance structures

Historically, the pastoral community in Fentale operated under traditional governance systems that facilitated conflict resolution and resource management. However, these structures have weakened over the years due to political changes and resource pressures. 'We used to have community meetings to make decisions together; now it feels like everyone is out for themselves,' lamented one elder.

This fragmentation of governance has left room for disputes to escalate, as there are fewer avenues for collective decision-making. The loss of communal unity has implications not just for resource management but also for social cohesion among community members. As challenges mount, the community increasingly recognises the urgent need to re-establish these governing structures to navigate the complexities of modern pastoral life.

The role of policy and legal frameworks

The case study highlights a pressing issue regarding the absence of formal policies that protect traditional livestock routes and grazing rights. Community dialogues revealed a strong desire for legal recognition of their mobility practices. A pastoralist pointedly stated, 'Without a law to protect our routes, we are vulnerable to losing everything.'

Formalising these rights through policy could help protect pastoralists from encroachment and better integrate their practices into broader land use planning. The community's call for

legally supported grazing routes reflects their understanding of the need for collaboration with governmental entities to protect their way of life amidst external pressures.

Coping strategies and adaptive measures

Faced with numerous challenges, community members have devised various adaptive strategies. Some have started diversifying their livestock ownership, focusing on smaller ruminants like sheep and goats that require less resource-intensive management. 'The goats and sheep are our safe bets; they provide us with income and are easier to manage during hard times,' noted a herder.

Additionally, some families have begun to engage in small-scale farming, alongside pastoralism, to try to build resilience against livestock losses. This dual approach has become crucial in ensuring not only food security but also additional income. 'It's not just about herding animals anymore; we are all trying to farm where we can,' explained one community member.

The importance of community resilience

The resilience of the Fentale community is evident through their adaptive responses to the shifting landscape. Many have taken the initiative to form groups aimed at resource management and sharing knowledge about sustainable practices among herders. During a community meeting, an elder stated 'Together we can figure out how to deal with *Prosopis* and find new ways to move when traditional paths are blocked.'

Community resilience hinges on collaboration and collective action, which have become increasingly vital in navigating the complexities of modern pastoralism. By empowering individuals to share insights and solutions, the community has the potential to strengthen in the face of adversity.

Conclusion

The challenges faced by pastoralists in Fentale district encompass an interplay of environmental degradation, socioeconomic pressures and governance issues. The narrative of resilience emerges prominently from conversations with community members, revealing their determination to adapt and safeguard their way of life. As articulated by one elder, 'If we don't unite and advocate for our rights, we will lose the things that define us.'

This case study underscores the critical need for concerted efforts to establish legal protections for livestock routes and sustainable environmental practices, and to reinstate traditional governance structures. Collaborative engagement between pastoralists, government entities and NGOs is pivotal in crafting solutions that honour the community's historical ties to their land while adapting to the challenges of a changing environment. By valuing their voices and integrating their traditional knowledge into policy-making, the community can work towards a more secure future that respects their pastoral identity.

Case study 3: Limitations to mobility, Eldas Constituency, Wajir County, Kenya

Irene Mukalo

Eldas Constituency is made up of arid and semi-arid landscapes with an estimated population of 98,500 residents, 80% of whom are mainly dependent on pastoralism. Livestock, including goats, sheep, camels and cattle, play vital roles economically and socially. The mobility system

has historically been governed by customary institutions, such as clan elders, which regulate access to grazing and mediate disputes.

Recent climatic events, including a severe drought between 2020 and 2022 followed by El Niño rains in 2023, have strained the mobility systems. Pastoralists have faced significant challenges, including the emergence of invasive species and the enclosure of grazing land due to settlements. One community elder poignantly underscored the interconnectedness of mobility: 'Mobility is part of our life. When one path is blocked, everyone's pattern is disturbed.'

Methodology

The research adopted qualitative exploratory case study methods, ensuring that community voices were central to problem diagnosis. Various participatory tools, including FGDs, KIIs and participatory mapping, were employed over a week of fieldwork conducted in June 2025. The study involved approximately 85 participants, including elders, women, youth and local officials, through structured interviews and discussions. The guiding research questions focused on the current state of livestock mobility, the causes of disruption and the resultant impacts on livelihoods and food security.

Drivers of mobility breakdown

The study identified several significant drivers contributing to the breakdown of mobility:

- **Ecological degradation:** the spread of *Prosopis juliflora* (locally known as mathenge) has choked traditional grazing routes and reduced pasture availability. Participants described how this invasive species quickly turns open lands into wastelands, with one lamenting: 'These invasive plants are choking our land.'

- **Land use change:** agricultural expansion and the fencing of communal lands have disrupted traditional livestock routes. 'People started planting crops and fenced off their pieces, so animals can't pass anymore,' noted a community member, highlighting the challenge of restricted access to essential grazing areas.

- **Tenure insecurity:** the absence of formal recognition for communal grazing lands has facilitated enclosures by individuals wielding state-issued title deeds. This situation creates a power imbalance and undermines collective land rights. A key informant stated: 'There is no title deed for grazing land. Anyone can fence and say it is theirs.'

- **Governance fragmentation:** the erosion of trust in local authorities – chiefs and elders – has compounded the challenges to governance and resource management. A frustrated participant stated: 'We reported to the area leaders, but they supported the enclosure instead.'

- **Infrastructure deficiencies:** the degradation of critical infrastructure, including water points and routes damaged by flooding, has further restricted livestock movement and increased the risks associated with mobility.

Impacts of mobility disruption

The disruptions to mobility have far-reaching implications for various dimensions of community life:

- **Economic impacts:** the reduction in livestock productivity has strained household economies. Families reported needing to sell livestock cheaply, exacerbating financial insecurities. A female participant articulated the problem: 'We sold livestock at throwaway prices and still couldn't feed our families.'
- **Nutritional impacts:** a decline in milk production has resulted in severe food security issues. One participant reported that 'Our children sleep hungry because milk is not enough.'
- **Social impacts:** the burden on women has intensified, as they manage livestock and provide for families while lacking a voice in governance. 'Men decide about land, but women carry the burden,' one community member explained.
- **Youth frustration:** young herders report feeling excluded from decision-making processes, leading to tensions between youth seeking immediate change and elders advocating for restraint. Highlighting the generational conflict in responding to the crisis, a participant said: 'Some youth wanted to bring down the fence, but elders calmed things down.'

Community responses and adaptive strategies

Communities in Eldas have demonstrated resilience and agency in the face of mobility disruptions. Adaptive strategies have emerged, which include herders using longer and less accessible routes to navigate blocked paths, even if they are three or four times the distance. Where conflicts occur, community members engage in dialogue, often appealing to elders and local leaders for negotiation. Increasingly, community members are advocating for their rights to mobility. Proposals for peaceful protests to raise awareness of blocked routes reflect a shift toward proactive engagement.

Conclusions and recommendations

The Eldas case study highlights that the challenges resulting from disrupted mobility are not purely ecological or logistical; they are deeply intertwined with social, economic and governance systems. The complexity of the issue demands a multifaceted approach to restoring mobility. To promote resilience among pastoralists, participants recommended legal recognition of routes; strengthening of community governance; rehabilitation of critical water points; collaborative efforts to manage invasive species; and market-based restoration initiatives for rangelands.

Ultimately, the future of pastoralism in Eldas and similar regions hinges on a renewed focus on mobility, which is essential for economic stability, food security and community cohesion. A concluding reflection from an elder encapsulates the community's collective sentiment: 'If we restore the paths, we restore our lives.'

Case study 4: Livestock and mobility in Makueni County, Kenya

Irene Nganga

In Makueni County, Kenya, livestock-keeping communities are facing numerous challenges related to livestock mobility, land use and socioeconomic dynamics. This case study found

significant trends and shifts in resource availability, governance and community relations that have resulted from environmental pressures, population growth and policy changes.

The study examines critical periods from 1975 to 2024. It notes that livestock routes were significantly impacted between 1995 and 2024 due to land subdivision from communal to private ownership. This transition has led to reduced grazing areas and increased inter-community tensions. A female FGD participant described how 'land subdivision sharply reduced access to communal grazing, causing conflicts and overgrazing in remaining areas'.

Contrary to earlier periods where livestock mobility was more prevalent, increased land subdivision and population pressure have significantly hindered traditional grazing routes. This erosion of pasture availability has contributed to food insecurity and poverty among households that rely heavily on livestock for their livelihoods. 'In 1975 to 1984, the number of animals greatly changed due to drought, but in 2005 to 2014 and 2015 to 2024 the numbers decreased not just from drought but also due to demarcation of land parcels,' explained a male FGD participant.

Livestock health, including higher disease prevalence and mortality rates, has worsened due to reduced mobility and inadequate veterinary services. As articulated by one male key informant, 'Livestock deaths are increasing due to limited movement and inadequate access to veterinary care.'

There has been increased encroachment of invasive species and long-term impacts of drought as significant challenges. 'Invasive species have increased significantly, affecting the pasture quality, which in turn reduces milk yield and worsens land degradation,' according to another male key informant.

Additionally, the dynamics within households have evolved, particularly regarding decision-making about livestock management. Historically male-dominated decisions are becoming more inclusive, with women increasingly consulted regarding livestock sales, as one male community member noted: 'For the past 10 years, men would sell part of the livestock only, but now discussions involve both men and women.'

Reflecting on the challenges, community members suggest multiple strategies for mobility improvement, including enhancing veterinary services and livestock markets, facilitating mobility through better infrastructure and establishing conflict resolution mechanisms. As a male key informant stated, 'There is need for more livestock infrastructure, e.g. veterinary services and organised livestock transport systems.'

Conclusion

This study underscores the vital need for holistic approaches to tackle the complex interplay of environmental, governance and socioeconomic dynamics affecting livestock mobility and community resilience in Makueni County. By emphasising community-driven solutions and investment in infrastructure, stakeholders can help restore traditional mobility patterns and improve food security for vulnerable pastoralist communities.

The insights gathered from community discussions demonstrate a nuanced understanding of the ongoing changes and challenges faced by these communities, advocating for integrated strategies to foster sustainable livestock management while addressing the pressing issues of food security and livelihood resilience.

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Cover: A Samburu boy and girl (L–R) with their herd of cattle 5 kms to the west of Oldonyiro town in Isiolo County, Kenya, 2018.
Credit: ILRI Livestock CRP/ Kabir Dhanji

Funded by

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This material has been funded by UK aid from the UK government; however the views expressed do not necessarily reflect the UK government's official policies.