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# Nexus between agriculture and livestock sectors in Kenya and Tanzania

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## ABSTRACT

This article examines the evolving integration of farming and livestock keeping in Kenya and Tanzania, and its impact on livelihoods, land use, food security, and the environment. It finds that “hybrid” agropastoral livelihoods, which blend these activities, are increasingly common as communities adapt to ecological pressure, land scarcity, and market changes. However, this integration is hindered by insecure land rights, gender inequality, conservation policies, and fragmented governance. The study also highlights the importance of cross-border mobility and informal trade for regional resilience. It concludes by urging for inclusive and coordinated policies that move beyond sectoral divides, empower marginalised groups, and are grounded in the ecological and lived realities of these regions to foster sustainable and equitable development.

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## KEYWORDS

Livelihoods; gender; food security; cross-border trade; Kenya; Tanzania

## 1. Introduction

Crop farming and livestock keeping are central to the political economy and cultural fabric of Kenya and Tanzania. Together, these sectors employ over 65% of the rural population and contribute significantly to national GDP, export earnings, and household nutrition (FAO 2023; KNBS 2022; NBS Tanzania 2022). While traditionally treated as distinct livelihood systems – agriculture associated with settled crop cultivation and livestock keeping with mobile pastoralism – the boundaries between these sectors have become increasingly porous (Smith 2019). This blurring is driven by land scarcity, climate change, evolving tenure arrangements, and shifting demographic pressures (Rudel and Hernandez 2017), creating a complex terrain of overlapping land uses, socio-cultural practices, and policy regimes (Allegretti 2022; Mwangi 2024).

In Kenya and Tanzania, ecological zones such as the Maasai Steppe, the arid and semi-arid lands (ASALs), and highland regions reflect diverse land-use strategies shaped by

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rainfall variability, soil conditions, and market access (Amwata and Nyariki 2021; Yanda et al. 2015). These ecological realities intersect with historical processes – colonial land alienation, post-independence reforms, and recent policy shifts which often involve the formalisation and privatisation of communal lands resulting in dynamic yet often fragile relationships between pastoral and agricultural communities (Marchant 2021). For instance, in Kajiado and Narok counties (Kenya) and Arusha and Simanjiro districts (Tanzania), the implementation of policies promoting individualised land registration and titling, often alongside the subdivision of former communal grazing areas, has accelerated sedentarization. This policy shift from communal tenure to private ownership has facilitated agricultural encroachment and led to overlapping claims, resource conflicts, and adaptations like mixed farming systems (Msoffe et al. 2019; Ripkey et al. 2021).

The intersection of agriculture and livestock keeping is further complicated by gender and generational divisions (Bryceson 2019; Contzen and Forney 2017). Women, though heavily involved in both subsistence farming and livestock management, face limited access to land, credit, and extension services (Mamun-Ur-Rashid, Kamruzzaman, and Mustafa 2017). Similarly, youth contend with landlessness and employment precarity, undermining their participation in rural production (Ude 2020). These exclusions are rarely addressed in land governance or agricultural policies. Despite growing recognition of the need for integrated rural development, policy frameworks in both countries remain siloed (Mpogole, Dimoso, and Mayaya 2020; Mudimu, Brüntrup, and Mutabazi 2026). Livestock and crop agriculture are often treated separately, with little consideration for cross-border herder mobility or ecological spillovers from land degradation and climate shocks. While tenure reforms such as Kenya's Community Land Act (2016) and Tanzania's Village Land Act (1999) aim to address these gaps, implementation challenges and political contestations persist.

This study investigates the agriculture-livestock nexus through a comparative lens, examining how environmental, institutional, and social factors shape rural livelihoods in Kenya and Tanzania. Grounded in ecological zonation data, policy analysis, and socio-economic trends, the study explores five key themes.

## **2. Conceptual and theoretical framework**

Understanding the dynamic relationship between agriculture and livestock keeping in Kenya and Tanzania requires an interdisciplinary conceptual lens that captures ecological, institutional, and socio-cultural dimensions. This section draws on three intersecting frameworks: political ecology, integrated land-use theory, and the gendered livelihoods approach. Together, these perspectives help explain how land-based livelihoods are shaped by both material conditions and the socio-political structures that mediate access to resources, labour, and power.

### **2.1. Political ecology and land-based livelihoods**

Political ecology provides a critical framework for understanding the environmental, political, and economic processes that shape natural resource use and access. Rooted in critiques of apolitical environmentalism, political ecology emphasises the role of historical power relations, state interventions, and local resistance in shaping land use outcomes

(Blaikie and Brookfield 1987; Robbins 2012). In the East African context, political ecology has been instrumental in unpacking how colonial legacies, post-independence land reforms, and current neoliberal land markets affect pastoral and agricultural systems (Galaty 2013; Rutten 2001).

In Kenya and Tanzania, political ecology sheds light on the ways in which state-driven modernisation, including the expansion of private farming, conservation areas, and infrastructure projects, has encroached upon traditional grazing lands. The framework also helps to analyse land conflicts arising from tenure insecurity, population growth, and competing claims between farmers and herders. Moreover, it allows for an examination of cross-border issues such as transboundary livestock movements and the regulatory asymmetries between the two countries.

## ***2.2. Integrated land-use and agropastoral systems theory***

Theoretical work on integrated land use and agropastoralism provides a complementary perspective that highlights the functional and ecological interdependence between livestock keeping and crop production. In semi-arid and sub-humid zones, such as those found in southern Kenya and northern Tanzania, mixed farming systems have evolved as adaptive responses to climatic variability and land scarcity (Scoones 1998; Thornton et al. 2007). These systems often involve the rotation of livestock and crops on the same plot, the use of manure to fertilise fields, and the use of crop residues as livestock fodder.

This model challenges rigid categorizations that separate farmers from pastoralists. Instead, it recognises that many rural households engage in diversified strategies that include both crop cultivation and livestock keeping. Such integration increases resilience by spreading risk across different production systems. However, it also presents new governance challenges – particularly where institutional frameworks do not account for multifunctional land uses or seasonal mobility.

In the Kenya-Tanzania borderlands, spatial overlaps in land use are not merely a reflection of demographic pressure but also of strategic adaptation to ecological gradients. Integrated land-use theory thus offers a lens through which to assess both the productive synergies and the spatial tensions that arise from agri-pastoral coexistence.

## ***2.3. Gendered livelihoods and access to resources***

A gendered livelihoods framework foregrounds the differentiated roles, responsibilities, and entitlements of men, women, and youth in rural production systems. Drawing from the sustainable livelihoods approach (Chambers and Conway 1992) and feminist political economy (Razavi 2009), this perspective emphasises that access to land, livestock, capital, and decision-making power is structured by gender and generational hierarchies.

In both Kenya and Tanzania, gender norms have historically relegated women to subsistence farming, while men dominate decision-making and control over livestock (Achandi et al. 2023; Njiru et al. 2023). However, these roles are shifting as women increasingly engage in dairy production, poultry, and small-scale agri-businesses, while also carrying the burden of unpaid reproductive labour (Henderson, Barnes, and Hammond 2024; Mwalyagile, Jeckoniah, and Salanga 2025). Youth, meanwhile, face structural exclusion due to inheritance systems, land scarcity, and limited access to credit or employment.

These exclusions are magnified by land reforms that nominally recognise communal rights but often reproduce patriarchal norms in practice (Daley and Englert 2010).

A gendered analysis is thus vital for understanding who gains and who loses in the ongoing reconfiguration of agricultural and livestock systems. It also informs policy recommendations by highlighting the need for inclusive tenure reforms, gender-responsive extension services, and targeted youth employment strategies. Taken together, these frameworks allow for a multidimensional understanding of the agriculture livestock nexus. Political ecology draws attention to historical and structural power dynamics; integrated land-use theory provides ecological and spatial insights into land-based production systems; and gendered livelihoods analysis unpacks intra-household and inter-generational inequalities. This conceptual scaffolding underpins the subsequent analysis of how land, labour, and livestock interact across ecological zones, policy regimes, and social identities in Kenya and Tanzania.

### **3. Methodology**

This study employs a comparative qualitative methodology grounded in case-based analysis to explore the interconnections between agriculture and livestock keeping in Kenya and Tanzania. The approach is designed to illuminate how land use, policy, and social dynamics unfold differently – and sometimes similarly – across national boundaries and ecological zones. The choice of methodology reflects the complexity of the research problem, which requires both spatial and institutional sensitivity, as well as attention to socio-cultural heterogeneity.

#### ***3.1. Research design and case selection***

The study adopts a comparative cross-border regional analysis, focusing on four counties/districts strategically selected for their ecological diversity, historical land use patterns, and socio-political significance. In Kenya, Kajiado and Narok counties represent a mix of pastoral and agro-pastoral systems, located within the Maasai rangelands and experiencing rapid land commodification, sedentarization, and conservation-driven land transformations. In Tanzania, Arusha and Simanjiro districts reflect parallel dynamics within a distinct tenure regime, where village land systems interface with protected areas and expanding cultivation. These locations were chosen based on key criteria: the presence of both crop cultivation and livestock keeping as dominant livelihoods; historical and contemporary experiences with land tenure reform; relevance to cross-border pastoral mobility and conflict; and representation of different agroecological zones, including highlands, savannah, and semi-arid lands.

#### ***3.2. Data sources***

The study employs a mixed-methods approach, relying primarily on secondary data analysis supplemented by qualitative insights drawn from the existing literature. The data sources were specifically selected to cover legal, socio-economic, ecological, and land-use aspects relevant to pastoralism in Kenya and Tanzania. Key quantitative data sources include official government reports from the Kenya National Bureau of Statistics (KNBS) (KNBS 2023) and the National Bureau of Statistics (NBS) Tanzania (NBS 2019, 2022), and sectoral reports from the respective Ministries of Agriculture and Livestock (KNBS 2024; URT 2024). Institutional data,

which informs trend analysis and policy contexts, was sourced from reports by the International Livestock Research Institute (ILRI) (Michael et al. 2018; Shikuku et al. 2024),

Essential policy documents underpinning the legal framework include the full text of Kenya's Community Land Act (2016) (Republic of Kenya 2016) and Tanzania's Village Land Act (1999) (URT 1999). Ecological and climate data, such as soil health and land cover changes, were drawn from specific regional and global datasets, notably the Africa Soil Information Service (AfsIS) (Hengl et al. 2015). Qualitative data, used to contextualise quantitative findings and provide rich narratives on land conflict and adaptation, was extracted from key case studies (e.g. Galaty 2013; Ojalammii 2006; Rutten 2001).

### 3.3. Analytical approach

A thematic analysis approach was employed to synthesise patterns across the five core themes identified in the conceptual framework: (1) land use patterns and ecological zones, (2) land tenure reforms and conflict, (3) gender, generation, and access to resources, (4) food security and environmental sustainability, and (5) cross-border mobility and regional policy coherence. A comparative analysis was conducted to identify convergences and divergences across the Kenyan and Tanzanian contexts, with particular attention to how similar ecological realities are mediated by differing institutional, legal, and historical frameworks. Spatial variation was further analysed by examining land cover changes, rainfall patterns, and livestock densities using national and regional datasets. The study used SPSS and Excel for analysis.

## 4. Results and discussion

### 4.1. Land use patterns and ecological zones

Table 1 shows the interface between agriculture and livestock keeping in Kenya and Tanzania is shaped fundamentally by ecological zonation and associated land use patterns.

Both countries exhibit a wide range of agroecological zones, from humid highlands conducive to crop production to ASALs where pastoralism predominates. This ecological diversity forms the material basis for differentiated but increasingly overlapping livelihood strategies.

**Table 1.** Comparative analysis of Kenya and Tanzania on the various aspects of land use.

Aspect	Kenya	Tanzania	Similarities
Agroecological zones	Wide range, including humid highlands and arid/semi-arid lands (ASALs).	Wide range, including humid highlands and arid/semi-arid lands (ASALs).	Both countries exhibit diverse agroecological zones influencing land use.
Land use patterns	Crop production in highlands, pastoralism in ASALs.	Crop production in highlands, pastoralism in ASALs.	Land use is shaped by ecological zonation highlands for crops, ASALs for livestock.
Livelihood strategies	Differentiated but increasingly overlapping (mixed farming).	Differentiated but increasingly overlapping (mixed farming).	Both show a trend toward integrated crop-livestock systems despite ecological differences.
Key influence	Ecological diversity drives agricultural and pastoral systems.	Ecological diversity drives agricultural and pastoral systems.	Both countries' agricultural-livestock interface is fundamentally shaped by ecology.

#### 4.1.1. Agroecological variation and livelihood strategies

Kenya and Tanzania are home to a gradient of ecological zones defined by altitude, rainfall, soil fertility, and vegetation. The highland areas of Kenya such as parts of Central Kenya and the Mau Escarpment are traditionally associated with intensive agriculture, especially maize, beans, and horticultural crops (Table 2).

In Tanzania, similar high-potential zones exist in Kilimanjaro and Southern Highlands. These regions are marked by relatively high rainfall (over 1,200 mm annually) and are dominated by smallholder farming systems, often on fragmented plots.

In contrast, the ASALs of southern Kenya (e.g. Kajiado, Narok) and northern Tanzania (e.g. Arusha, Simanjiro) are characterised by lower and more variable rainfall (300–800 mm annually), poor soils, and periodic drought. These ecological conditions historically favoured mobile pastoralism among groups such as the Maasai, Samburu, and Barabaig. However, climatic stress, land fragmentation, and policy shifts have increasingly pushed pastoralists toward sedentarization and mixed agropastoral practices.

According to recent land cover change analyses, areas previously dominated by open grazing lands are now experiencing expansion of cultivated fields, particularly along riverine and peri-urban corridors (Mati et al. 2008; Mmbaga et al. 2017). In both countries, this transformation reflects both demographic pressure and attempts at livelihood diversification.

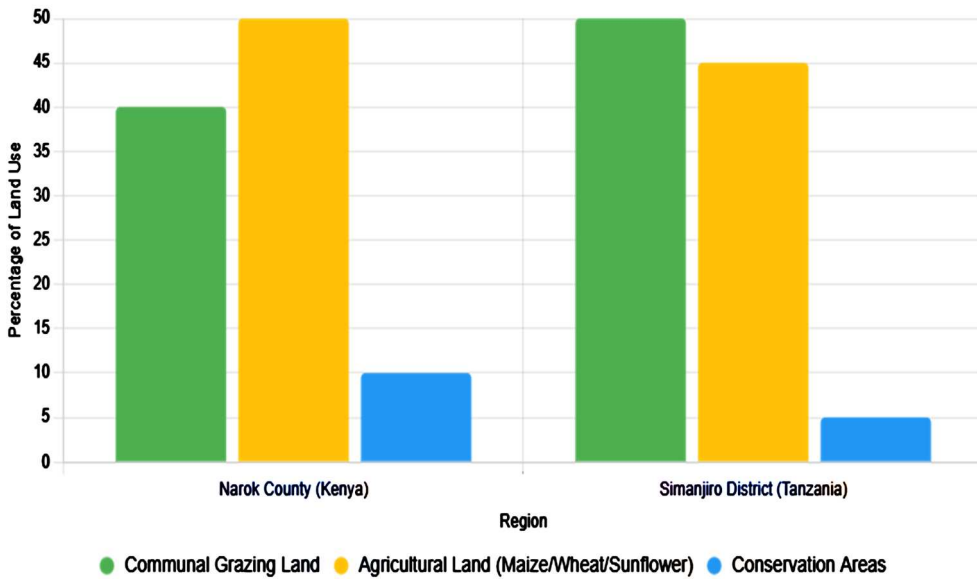
#### 4.1.2. Overlapping land use and resource competition

One of the most visible outcomes of changing land use patterns is the growing spatial overlap between pastoral and agricultural systems (see Figure 1).

In Narok County, for instance, former communal grazing areas have been subdivided into individual plots, with significant acreage converted to maize and wheat farming (Galaty 2013). In Simanjiro District, pastoralist communities have adopted maize and sunflower cultivation on formerly communal rangelands, partly as a hedge against livestock losses from drought or disease (Goldman and Riosmena 2013). This overlap has generated a new landscape of competition. Farmers complain about crop damage by roaming livestock, while pastoralists decry the fencing off of traditional grazing corridors.

**Table 2.** Aspects of highland, arid and semi-arid comparison between Kenya and Tanzania.

Aspect	Highland areas (Kenya & Tanzania)	Arid and semi-arid lands (ASALs) (Kenya & Tanzania)
Regions	Kenya: Central Kenya, Mau Escarpment Tanzania: Kilimanjaro, Southern Highlands	Kenya: Kajiado, Narok Tanzania: Arusha, Simanjiro
Rainfall	High (>1,200 mm annually)	Low and variable (300–800 mm annually)
Soil fertility	Relatively fertile	Poor soils
Primary land use	Intensive smallholder farming (maize, beans, horticulture)	Traditionally mobile pastoralism (Maasai, Samburu, Barabaig), now shifting to mixed agropastoralism
Farming system	Smallholder, fragmented plots	Pastoralism with increasing cultivation due to land pressure
Key challenges	Land fragmentation, high population density	Drought, land degradation, sedentarization, policy shifts
Recent trends	Stable agricultural dominance	Expansion of cultivated fields along riverine and peri-urban areas (FAO 2022)
Drivers of change	High agricultural potential, stable rainfall	Climate stress, livelihood diversification, demographic pressure



**Figure 1.** Land use changes in Nairok and Simanjiro district.

Source: Authors' computation.

The expansion of conservation areas and wildlife conservancies, particularly in Kenya, adds a third layer of land use that often restricts mobility and access to water for both herders and cultivators.

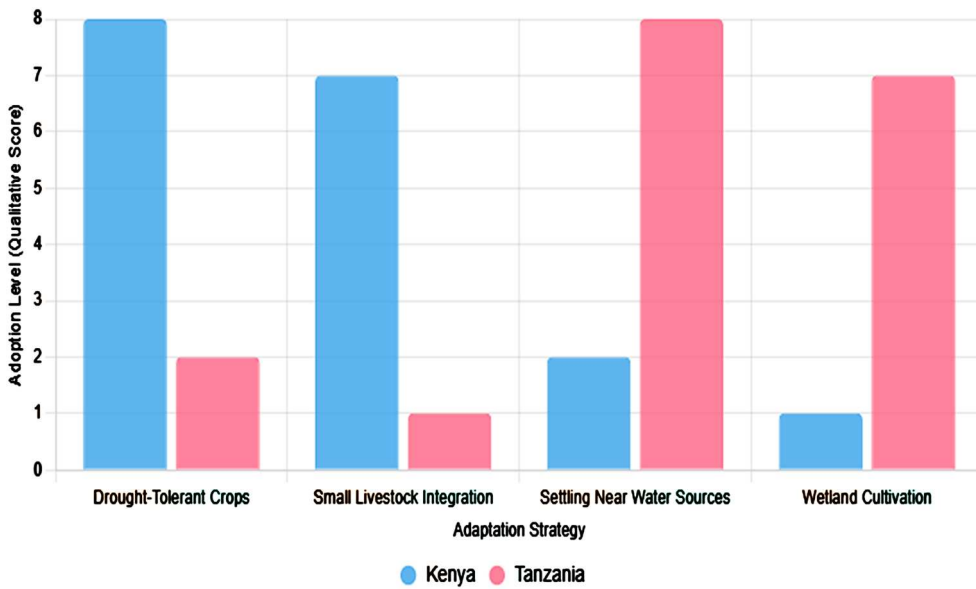
The friction between these systems is further exacerbated by weak enforcement of land use planning. While both Kenya and Tanzania have adopted national land use policy frameworks – such as Kenya's National Spatial Plan (2015–2045) and Tanzania's Land Use Planning Framework (2013) – implementation at the local level remains uneven due to capacity constraints, political interference, and competing interests.

#### **4.1.3. Climate variability and adaptive land use**

Climate change acts as a stress multiplier in the shifting agriculture-livestock nexus (Figure 2).

In Kenya, long-term rainfall variability has shortened growing seasons in marginal areas, prompting farmers to adopt drought-tolerant crops or integrate small livestock like goats and poultry (FEWSNET 2021). Similarly, Tanzanian pastoralists are increasingly settling near river valleys or wetlands for access to water, leading to wetland cultivation and ecological degradation (Jambau 2021).

Adaptation strategies have thus led to what might be described as 'adaptive overlap' where households are compelled to blur traditional livelihood boundaries in response to ecological uncertainty. However, such strategies often produce new vulnerabilities. For instance, the shift of some pastoralists towards sedentary and semi-sedentary lifestyles to secure access to grazing near settlements often leads to land degradation from overstocking and limited rotational grazing, which is a new vulnerability compared to the extensive degradation seen in traditional mobile systems. Furthermore, this concentration can introduce increased disease transmission risk between livestock and humans due to



**Figure 2.** Adaptation strategies in response to climate change between Tanzania and Kenya.  
Source: Authors' computation.

close proximity. Meanwhile, smallholder farmers operating in increasingly marginal areas (an adaptation strategy driven by land scarcity) risk total crop failure from extreme weather events (drought or floods).

A specific new vulnerability here is the increased reliance on a narrow range of expensive, drought-resistant seeds, which, if the resistance fails, can result in greater financial losses than traditional diversified planting. Additionally, the adoption of water harvesting techniques like earthen dams can, in some areas, create new vulnerabilities by becoming breeding grounds for disease vectors such as mosquitoes (malaria) or snails (schistosomiasis), particularly if maintenance is poor.

#### **4.1.4. Spatial inequality and land use dynamics**

The spatial distribution of productive land in Kenya and Tanzania is deeply unequal, driven by historical injustices and contemporary pressures. Large-scale commercial farms, often owned by elites, dominate high-potential areas, while smallholders and pastoralists are confined to ecologically vulnerable zones with limited services (Table 3). For instance, in Narok, Kenya, political elites control large wheat and barley farms, exacerbating spatial disparities (Rutten 2001). Concurrently, land use patterns are undergoing rapid transformation due to ecological stress (defined here as severe environmental degradation, such as prolonged drought, soil erosion, and biodiversity loss, that compromises the land's productive capacity), demographic growth, and shifting tenure systems, producing hybrid agropastoral landscapes.

These hybrid agropastoral systems are characterised by a dynamic and often conflicted blend of traditional pastoralism (livestock rearing) and settled agriculture (crop farming) within the same area, often emerging as a coping mechanism to climate change and land fragmentation. This transformation is marked by competition (specifically, the struggle over

**Table 3.** Summary of spatial inequality and land use dynamics.

Aspect	Description	Key issues	Examples
Land distribution	Unequal access to high-potential land	Elite capture, historical injustices	Large-scale farms in Narok owned by elites
Policy focus	Productivity-driven, neglects equity	Disconnect with ecological and social realities	Limited services in vulnerable zones
Land use changes	Shift to hybrid agropastoral systems	Ecological stress, demographic pressure	Competition in Narok, Simanjiro

increasingly scarce resources like water, grazing land, and fertile soil, measured by competitive parameters such as the intensity of land use conflicts, changes in land prices, and the rate of enclosure in Narok and similar areas), adaptation, and persistent inequality.

National agricultural and livestock policies often prioritise productivity over equity or sustainability, resulting in a disconnect between policy frameworks, ecological realities, and rural livelihoods. This lack of integration hinders effective land management and overlooks the multifunctional role of land in agropastoral systems.

## 4.2. Land tenure and conflicts

Land tenure systems in Kenya and Tanzania mediate the interaction between agriculture and livestock keeping, shaping access, use, and transfer of land. Despite significant reforms such as Kenya's 2012 Land Act (which sought to rationalise land ownership and establish community land rights) and Tanzania's Village Land Act of 1999 (which devolved land administration to local levels) tenure insecurity persists. This insecurity is particularly acute for pastoralists, women, and youth, fuelling resource conflicts and undermining equitable land access, often because the implementation of these reforms has been slow, incomplete, or faced resistance.

### 4.2.1. Historical legacies and legal pluralism

Colonial and post-colonial land administration has created complex, hybrid tenure systems. In Kenya, the 2010 Constitution and Community Land Act (2016) recognise customary rights but face uneven, politicised implementation. In Tanzania, the 1999 Land Act and Village Land Act vest control in Village Councils but are undermined by overlapping jurisdictions, causing uncertainty (URT 1999). This legal pluralism complicates land-use planning and weakens community claims, especially for pastoralists.

### 4.2.2. Individualisation and fragmentation

Land individualisation, such as the subdivision of group ranches in Narok and Kajiado, Kenya, and village land certification (CCROs) in Tanzania, aims to enhance tenure security but often leads to fragmentation, elite capture, and speculative markets (Galaty 2013; Mwangi 2007). For pastoralists, privatisation disrupts mobility, reduces access to water and grazing, and forces herders into protected areas, triggering conflicts with farmers and authorities (Ntumva 2022).

### 4.2.3. Land conflicts and cross-border issues

Ecological stress, population pressure, and tenure insecurity drive frequent land conflicts, particularly in borderlands. Seasonal migrations, such as Tanzanian herders entering Kenya

during droughts, spark tensions, crop destruction, and violence (Mwangi and Ostrom 2009). Weak intergovernmental coordination and differing regulatory frameworks exacerbate these issues, with Kenya's devolved land governance contrasting Tanzania's centralised approach.

#### **4.2.4. Marginalised groups: women and youth**

Women and youth face structural tenure insecurity. Customary systems in Kenya often deny women inheritance, while Tanzania's village land registration sidelines women's voices despite legal provisions (Daley and Englert 2010). Youth are excluded by land scarcity, commercialisation, and generational hierarchies, pushing them into informal livelihoods like wage labour or urban migration (Table 4).

### **4.3. Gender, generation, and resource access**

Gender and generational dynamics profoundly influence access to land, labour, and capital in agropastoral systems, creating differentiated opportunities and vulnerabilities.

#### **4.3.1. Gendered divisions of Labour**

Men typically control livestock, land transactions, and cash crops, while women manage subsistence farming, small livestock, and household food security. In Maasai communities, men handle cattle herding, while women cultivate plots and produce dairy (Hodgson 2001; Nkedianye et al. 2020). Customary norms and male-dominated lineage systems limit women's ownership, despite progressive laws like Tanzania's Land Act (1999) and Kenya's Constitution (2010).

#### **4.3.2. Youth exclusion**

Youth face landlessness due to subdivision, population growth, and commercialisation. Considered dependents, they lack agency in land decisions, pushing them toward wage labour, transport, or urban migration (Clendenning 2020). This exclusion undermines knowledge transfer and sustainability.

#### **4.3.3. Customary institutions and resistance**

Customary institutions, dominated by male elders, marginalise women's participation in land governance (Table 5). Tanzania's Village Land Councils require women's inclusion, but their influence remains limited (Daley and Englert 2010). However, women's groups and youth are resisting through cooperatives, advocacy, and innovative livelihoods like mobile markets and eco-tourism (Mahapatra and Singh 2025; Uduji and Okolo-Obasi 2023).

**Table 4.** Summary of land tenure and conflicts.

Aspect	Description	Key issues	Examples
Legal pluralism	Hybrid statutory and customary systems	Overlapping jurisdictions, tenure insecurity	Uneven implementation of Kenya's Community Land Act
Individualisation	Shift to private titles, village certification	Fragmentation, elite capture	Subdivision of group ranches in Narok, Kajiado
Conflicts	Disputes over land and resources	Ecological stress, cross-border tensions	Tanzanian herders in Kenyan borderlands
Marginalised Groups	Women, youth face access barriers	Customary norms, land scarcity	Women excluded from inheritance in Kenya

**Table 5.** Summary of gender and generational dynamics.

Aspect	Description	Key issues	Examples
Gendered Labour	Men control livestock, women manage subsistence	Limited women's ownership	Women's dairy production in Maasai communities
Youth Exclusion	Limited land access for youth	Land scarcity, commercialisation	Youth in Narok turning to boda-boda transport
Resistance	Women, youth organise for rights	Structural barriers persist	Women's land cooperatives in Tanzania

#### **4.4. Food security and environmental sustainability**

The integration of agriculture and livestock keeping impacts food security and environmental sustainability, with pressures from population growth, climate variability, and unsustainable land use eroding resource bases.

##### **4.4.1. Productivity and food insecurity**

ASALs in Kenya support 70% of livestock but produce less than 10% of staple crops, while Tanzania faces periodic shortages in regions like Dodoma (Babune 2022; Bosire et al. 2022). Low productivity stems from soil degradation, limited inputs, and weak extension services, increasing reliance on food aid and markets.

##### **4.4.2. Livestock and degradation**

Unregulated grazing and sedentarization cause soil erosion and desertification, while agricultural expansion fragments grazing corridors, heightening human-wildlife conflict (Kariuki et al. 2021). Livestock emissions also pose challenges, though climate-smart practices offer solutions.

##### **4.4.3. Climate change impacts**

Prolonged droughts and erratic rainfall reduce yields and livestock viability, with Kenya's 2020–2022 drought affecting millions (Duba 2024). Adaptation strategies like drought-tolerant crops face low uptake due to financial and cultural barriers.

##### **4.4.4. Integrated solutions**

Agroecology and mixed crop-livestock systems enhance resilience, with practices like legume integration improving soil fertility (Table 6). Community-based resource management and inclusive policies are critical for sustainability.

#### **4.5. Cross-border mobility and trade**

Cross-border mobility and trade between Kenya and Tanzania are vital for agropastoral resilience but face challenges from policy mismatches and securitisation.

##### **4.5.1. Pastoral mobility**

Transhumance supports livestock survival but is constrained by land fragmentation and border securitisation, leading to conflicts during droughts (Greiner 2012). Differing tenure and conservation policies further limit mobility.

**Table 6.** Summary of food security and sustainability.

Aspect	Description	Key issues	Examples
Food Insecurity	Low productivity in ASALs	Soil degradation, limited inputs	Kenya's ASALs produce <10% of staples
Environmental Degradation	Grazing, agricultural expansion	Erosion, biodiversity loss	Fragmented corridors near conservancies
Climate Change	Droughts, erratic rainfall	Reduced yields, livestock losses	2020–2022 drought in Kenya
Integrated Systems	Agroecology, mixed farming	Limited uptake of solutions	Legume rotations in Central Kenya

#### 4.5.2. Informal trade

Informal markets like Namanga facilitate food security but face regulatory barriers, with women traders particularly vulnerable (Koroma et al. 2017). Trade supports price stability and income generation.

#### 4.5.3. Regional integration

The East African Community promotes trade and resource sharing, but national priorities and weak coordination hinder progress (EAC 2019). Pastoralists are often mischaracterised as security threats.

#### 4.5.4. Opportunities for collaboration

Harmonised veterinary standards, joint grazing agreements, and community conservancies offer pathways for resilient, inclusive cross-border governance (see Table 7)

## 5. Discussion

### 5.1. The hybrid nature of livelihoods

The traditional, rigid distinction between 'farmers' and 'pastoralists' is no longer accurate in many parts of Kenya and Tanzania. Rural households are increasingly adopting hybrid livelihoods that combine crop cultivation and livestock keeping. This adaptive strategy is a response to climate variability and market shifts, allowing communities to mitigate risk and optimise resource use. For example, former pastoralists in areas like Narok and Simanjiro are now cultivating crops like maize, while farmers in regions such as Kilimanjaro and Meru are integrating dairy cattle into their farming systems. Empirical research confirms this trend of livelihood diversification across East Africa, demonstrating that it is an essential risk management strategy for many households, particularly in the face of recurrent

**Table 7.** Summary of cross-border dynamics.

Aspect	Description	Key issues	Examples
Pastoral Mobility	Transhumance for pasture access	Land fragmentation, securitisation	Tanzanian herders facing hostility in Kenya
Informal Trade	Cross-border markets for food security	Regulatory barriers, gender vulnerabilities	Namanga market trade in maize, livestock
Regional Integration	EAC frameworks for cooperation	Weak coordination, national priorities	Inconsistent SPS standards
Opportunities	Harmonised policies, community solutions	Limited implementation	Amboseli-West Kilimanjaro conservancies

droughts and declining livestock-to-human ratios (Marty et al. 2023; McCabe, Leslie, and DeLuca 2010). For the Maasai of northern Tanzania, for instance, the adoption of cultivation, initially out of necessity but often later by choice, has been a key component in a strategy to remain pastoralists by strengthening their overall economic resilience (McCabe et al. 2014). This blurring of lines isn't just an economic trend; it's also influenced by shifts in gender roles, generational changes, ecological pressures, and institutional factors (Little et al. 2001; Marty et al. 2023).

Furthermore, this process is socially differentiated, with both the wealthier and poorer segments of pastoral societies often showing the highest propensity to diversify, albeit for different reasons the wealthy to build wealth, the poor to survive (Little et al. 2001). Consequently, policies that rely on outdated, discrete classifications risk overlooking the complex, innovative strategies that people are already using to survive and thrive. An integrated planning approach that recognises the symbiotic relationship between livestock and crops for instance, through nutrient cycling and the use of manure – is crucial for supporting these adaptive practices, as agroecological intensification is seen as a viable future for food and farming systems in the region (Johansson, Martin, and Mapunda 2023).

## **5.2. Resource governance and social inequality**

Access to critical resources like land, pasture, and water is a central issue in agropastoral systems, often leading to conflict and negotiation, which is consistently documented across East Africa (Kisoza 2014; Luanda 2020). Despite statutory reforms aimed at securing land rights, such as community titling, many traditional tenure systems and instances of elite capture still exclude women, youth, and marginalised ethnic groups (Raycraft et al. 2025). This elite capture often involves powerful individuals, including local and national elites, manipulating flexible customary rules or state bureaucracies to privatise communal rangelands, effectively enclosing the commons and monopolising access to vital water and pasture, which historically served as key drought-coping resources for the wider community (Raycraft et al. 2025). These inequalities are particularly pronounced along gender and generational lines.

Women, who are often responsible for the majority of agricultural labour and household food security, frequently lack decision-making power over land and livestock a disparity starkly illustrated by estimates that, while 70%–90% of all wealth in Africa is generated through land, less than 10% is owned by women (Mataka, Kaitibie, and Ratna 2023). At the same time, young people are facing increasing landlessness and underemployment, leading to disillusionment with rural life, a trend that is fuelling out-migration and social differentiation within agro-pastoral communities (McCabe, Leslie, and DeLuca 2010). Furthermore, conservation policies and large-scale land acquisitions for tourism, agribusiness, or carbon markets can displace agropastoral communities and restrict their vital mobility (Brockington and Wilkie 2015). For instance, the creation of protected areas often encloses critical wet-season grazing lands, increasing hunger, debt, and conflict among agropastoral households by limiting their adaptive movement, as modelled in studies focusing on Kenyan rangelands (Pricope et al. 2013; Warriar et al. 2024). Without frameworks that prioritise environmental justice and inclusive land-use planning, these sustainability initiatives can inadvertently worsen historical

dispossession by overlooking the sophisticated, adaptive nature of mobile pastoralism, which, when supported, can enhance biodiversity and conservation outcomes (Darnet and Barnaud 2025).

### **5.3. Transboundary interdependence and regionalism**

Agropastoral systems in Kenya and Tanzania are intrinsically linked by shared ecosystems, including watersheds, wildlife corridors, and drought cycles. However, national policies often fail to acknowledge this spatial continuity, viewing cross-border movement as a security threat rather than a vital adaptive mechanism. This overlooks the resilience and fluidity of borderland economies. Cross-border trade and cooperation are essential for food security and market access in these regions, a phenomenon that has been demonstrated to be critical for the survival of millions in East Africa (Little et al. 2001). Yet, these efforts are often hindered by bureaucratic barriers, poor infrastructure, and a focus on securitisation – a policy framing that has been shown to delegitimize and restrict essential pastoral mobility (Marty et al. 2023).

Furthermore, the disproportionate negative impact of these barriers falls heavily on women informal cross-border traders (ICBT), who dominate the trade of essential food and industrial goods, facing harassment and limited access to formal regional benefits despite their crucial role in regional food supply. While the East African Community's integration agenda holds promise, it must more effectively incorporate the priorities of local communities, especially women and informal traders. There are, however, promising signs of new forms of transboundary governance, such as joint veterinary campaigns and cross-border community conservancies, which are recognised as vital steps towards securing livestock health and peace in shared ecosystems (FAO 2019). These initiatives demonstrate how solutions can be co-produced by blending indigenous knowledge with formal institutional support, offering a path toward more effective and regionally sensitive development that acknowledges mobility not as a problem, but as a climate-adaptive strategy (IGAD 2023).

## **6. Conclusion and policy recommendations**

This article has examined the intricate and evolving relationship between agriculture and livestock keeping in Kenya and Tanzania, with a focus on how this dynamic shapes livelihoods, resource governance, environmental sustainability, and cross-border interactions. The findings emphasise that agropastoral systems in both countries are not only ecologically integrated and socially embedded, but also subject to intense political and institutional challenges. With climate variability, land pressures, and demographic shifts intensifying, the resilience of these systems and the people who depend on them will be increasingly tested.

What emerges from this analysis is the urgent need to move beyond rigid, top-down, and fragmented development approaches. Livelihoods in the region are characterised by fluidity, innovation, and adaptation – qualities that must be supported by responsive policy frameworks. When properly managed, the integration of crop and livestock systems offers immense potential to improve food security, enhance ecological sustainability, and drive inclusive economic growth. However, this potential can only be realised

if existing inequalities, policy incoherence, and institutional blind spots are meaningfully addressed.

To fully leverage the potential of agropastoral systems in Kenya and Tanzania, policy and development efforts should be guided by five key principles. Policymakers should support integrated livelihoods by moving away from siloed service delivery and, instead, designing holistic extension programmes that address the combined needs of both farmers and livestock keepers. This includes promoting agroecological approaches and investing in market linkages. Ensuring equitable land access is also critical, which can be achieved through legal recognition of customary rights, participatory land-use planning, and expediting community land registration while protecting pastoral corridors.

To strengthen climate resilience, efforts should focus on expanding early warning systems, investing in climate-resilient infrastructure like water harvesting systems, and promoting access to climate finance for local communities. Improving cross-border coordination is essential for the mobility and trade vital to local economies; this requires harmonising veterinary, trade, and phytosanitary regulations across the Kenya-Tanzania border and developing joint cross-border grazing agreements. Lastly, fostering inclusive governance is key, which involves replacing bureaucratic silos with multi-sectoral and multi-level governance approaches that strengthen county – and village-level institutions and facilitate intergenerational and interethnic dialogue. The intertwined challenges and opportunities in agriculture and livestock development in Kenya and Tanzania reveal a broader narrative of managing land, identity, and survival in a changing Africa. Policies that value diversity, adapt to complexity, and centre local voices are not only more just – they are also more effective. As both countries navigate the twin imperatives of sustainability and equity, the agropastoral nexus offers a critical site for transformative change.

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