

Revitalization of Rural Livelihoods Through Land Use Planning in Arid and Semi-Arid Lands in Ewuaso Oo'nkidongi Ward Kajiado County

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Abstract

The sustenance of livelihoods in arid and semi-arid lands (ASALs) in Kenya is grappled with major challenges, that are brought about up as a result of the impacts of climate change, such as floods, droughts, and unpredictable rainfall patterns. This paper looks into into insights from an empirical investigation into institutional frameworks, resource use, and resilience strategies among households in Ewuaso Oo'nkidongi Ward, Kajiado County. Key livelihood activities in this semi-arid region are centred on agriculture, particularly livestock rearing, complemented by essential services such as healthcare and commerce. Based on data collected during the 2021–2022 second-year Rural Planning Studio, the study employed multiple methods, including interviews, focus group discussions, and 100 household questionnaires. GPS technology was utilised to map vital community assets, including water sources, schools, and health facilities. The findings point out various factors such as extreme temperatures, low rainfall, and inadequate infrastructure that have immensely constrained the livelihoods of local communities. Additional challenges include land fragmentation, climate-related vulnerabilities, and socio-cultural shifts undermining traditional pastoralism. Sparse household distribution further complicates access to critical services, underscoring the need for integrated and immediate interventions.

Keywords: Revitalisation, land use planning, livelihoods, climate change, resilience

INTRODUCTION

In ASALs, the inconsistent availability of resources constrains the viability of alternative livelihoods. Livestock production, main source of income and employment, remains vital to household survival (Headey et al., 2012).

Climate change has though increased the vulnerability of pastoralist livelihoods, enhancing their exposure to poverty and food insecurity. Scholars have extensively studied challenges in ASALs, including nutrition, livestock rearing, livelihood diversification, herd decision-making, market instability, and animal diseases (Little et al., 2001a; Homewood, 2008; McCabe et al., 2014).

The Intergovernmental Authority on Development (IGAD, 2020) recognises pastoralism as the a major livelihood in ASALs, contributing significantly to the production sector and demonstrating resilience

to climate change, despite its dependence on natural resources.

Also Nyariki (2017) estimates that pastoralism provides direct employment to 2.2 million Kenyans; however, indirect employment in sectors such as livestock trade, transport, leather, and slaughterhouses is more challenging to quantify.

Despite its economic importance, pastoral areas remain synonymous with poverty. Homewood (2008) highlights the plight of Maasai communities in Kenya and Tanzania, while more recent evidence shows that pastoralist livelihoods continue to dwindle due to climate-related shocks, limited access to essential services, socio-cultural constraints, and external pressures such as land grabs and infrastructure projects that displace communities.

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Resilience among ASAL communities has been a recurring research theme (Headey et al., 2013; IGAD, 2017; Unks et al., 2019; Nyariki, 2017). Resilience often manifests in livelihood diversification (Nyariki, 2017); however, persistent challenges, such as a lack of capital, poor infrastructure, and limited technical expertise, hinder poverty reduction efforts.

Uptake of improved livestock practices remains low, further limiting adaptive capacity. This study, therefore, explores the potential of land use planning as a tool for enhancing resilience and revitalising livelihoods in ASALs. Specifically, it examines how coordinated land use can mitigate unsustainable exploitation of resources, improve access to services, and harmonise competing land uses.

The case study of Ewuaso Oo'nkidongi Ward provides empirical evidence for designing strategies to revitalise rural livelihoods while balancing environmental protection and economic development.

THEORY

Pastoralism and Livelihoods in Kenya

Pastoralism which has been practiced for centuries, is the most sustainable production system in Kenya's drylands. Government estimates indicate that over 60% of all livestock is located in ASALs, employing nearly 90% of local populations and contributing about 10% to the national GDP (GoK, 2008). Schilling and Werland (2023) note that over 9 million Kenyans depend on pastoralism, particularly in arid and semi-arid regions.

Pastoralism takes two forms: nomadism and transhumance (Leshan et al., 2013). Nomadic pastoralism involves seasonal and variable migrations in search of water and pasture, while transhumance follows a cyclical migration pattern between fixed settlements.

Beyond its economic role, pastoralism embodies cultural identity. It provides prestige, wealth, dowry, and serves as a mechanism for conflict resolution (Nyariki & Ngugi, 2002). Its resilience is reflected in mobile livestock management, underpinned by traditional ecological knowledge (Nyariki & Amwata, 2019).

Revitalisation and Resilience in ASAL Communities

Revitalisation in pastoral contexts primarily targets the availability of pasture and water—core constraints on livelihoods. Interventions that enhance these resources are crucial. According to USAID (2016), there is no “silver bullet” for resilience in drylands; rather, multiple incremental strategies, such as livelihood diversification, are necessary when adapted to local contexts. This study therefore considers land as the foundational resource on which other livelihoods depend, justifying the focus on land use planning.

Resilience is the capacity to “bounce back” after shocks (Little & McPeak, 2014; Kumar et al., 2020). It emphasizes adaptability and transformability rather than static survival. Linking resilience with livelihoods enables a deeper understanding of household and community dynamics in responding to shocks (Scoones, 2009).

For this study, livelihood resilience is understood as the community's ability to restore prior conditions after disruptions (Sarker et al., 2019). Importantly, resilience in ASALs requires institutional strategies, such as inclusive land tenure systems and collective decision-making processes that facilitate access to grazing and water resources.

Livelihoods of Pastoral Communities

Chambers and Conway (1992) define a livelihood as “the capabilities, assets (including material and social resources), and activities for ways of living.” For a livelihood to be sustainable it should cope with shocks, recover, and maintain or enhance its assets without degrading natural resources.

Pastoralists often diversify livelihoods to reduce vulnerability. Diverse systems are less susceptible to shocks and more sustainable over time (Ellis, 1999). However, rural households in ASALs face limited access to markets due to poor infrastructure, low purchasing power, and high levels of environmental risk (Agrawal & Perrin, 2008).

Over generations, pastoralists have developed resilience strategies such as migration and diversification. Yet, mobility has declined due to children's education, dietary changes, and permanent housing (Unks et al., 2019). Sustainable

rural livelihoods in ASALs can only be achieved if natural resources are used responsibly.

Land Use Planning in ASALs

Land use planning responds to the complex drivers acting on land and the values and aspirations of communities. In rural contexts, it must address the rising demand for landscapes to deliver multiple outcomes: economic growth, social development, biodiversity protection, renewable energy, tourism, and sustainable agriculture.

In Kenya's arid and semi-arid lands (ASALs), pastoralism has historically been the dominant livelihood, but it has evolved significantly due to shifts in social, economic, ecological, and land tenure dynamics. Huck (2013) observes that in uncertain environments, pastoralists engage in diverse resource generation activities, ranging from traditional livestock-forage systems to newer strategies such as petty trade, wage labour, and small-scale agriculture. Similarly, in Ethiopia, Headey et al. (2012) concluded that investments in livestock should aim to transform the pastoralist sector into a more profitable, integrated, and resilient economic system.

In arid landscapes, rainfall variability and forage availability remain the principal determinants of pastoral decision-making. Herders generally adopt two options: (i) use local grazing patches—often in competition with neighbours—to minimize migration risks; or (ii) migrate to distant grazing lands, accepting uncertainties about resource quality. In practice, most Kenyan pastoralists now adopt seasonal or opportunistic herding strategies, often combining semi-mobile or fixed housing with herd movements rather than moving entire households (Homewood, 2008).

Like many ASAL regions in Kenya, Kajiado West suffers from inadequate infrastructure and limited services. The fragile ecology, underdeveloped economy, and difficult terrain constrain development. Transport facilities are poor, and educational institutions, markets, and energy systems remain inadequate. These deficiencies exacerbate poverty, food insecurity, and malnutrition.

Land use planning offers an opportunity to guide short- and long-term land management decisions through systematic assessment of existing

conditions, identification of goals and objectives, and formulation of management actions to achieve desired outcomes. The planning process highlights both opportunities and constraints and incorporates the interests of multiple stakeholders, including government agencies, private sector actors, and NGOs. By embedding laws, policies, and institutional mechanisms into planning processes, land use planning can reduce vulnerabilities associated with environmental shocks, socio-economic trends, and seasonal cycles, while enhancing pastoralists' resilience.

Study Area

Kajiado County is administratively divided into five sub-counties: Kajiado Central, Kajiado North, Kajiado West, Kajiado East, and Kajiado South. The study focused on Kajiado West Sub-County, which borders Kiambu and Nairobi counties to the north. The sub-county comprises several wards, including Keekonyokie, Magadi, Iloodokilani, Mosiro, and Ewuaso Oo'nkidongi.

Ewuaso Oo'nkidongi Ward, the specific study area, lies between latitude 1°0' S and 1°25' S and longitude 36°0' E and 36°45' E. The ward covers approximately 3,664.6 km² and borders four counties: Narok (northwest), Nakuru (north), Kiambu (northeast), and Nairobi City (east).

According to the 2019 census, the ward had a population of 125,676, comprising 62,725 males and 62,948 females. This translates to a population density of 34 persons per km² and approximately 42,774 households. Several key towns and local centres are located within the ward, including Ewuaso Kedong, Mosiro, Kibiko, Saikeri, and Kimuka **Figure 1**.

RESEARCH METHODS

This study primarily relied on data collected during the 2021–2022 second-year Rural Planning Studio in Ewuaso Oo'nkidongi Ward. Complementary secondary literature was also reviewed and analyzed to provide a comprehensive understanding of the relationship between livelihoods, natural resources, and land use planning. The research objective was to assess the adverse factors affecting pastoral livelihoods in the Ewuaso Kedong area and to propose strategies and policies for mitigating vulnerability while reducing environmental degradation.

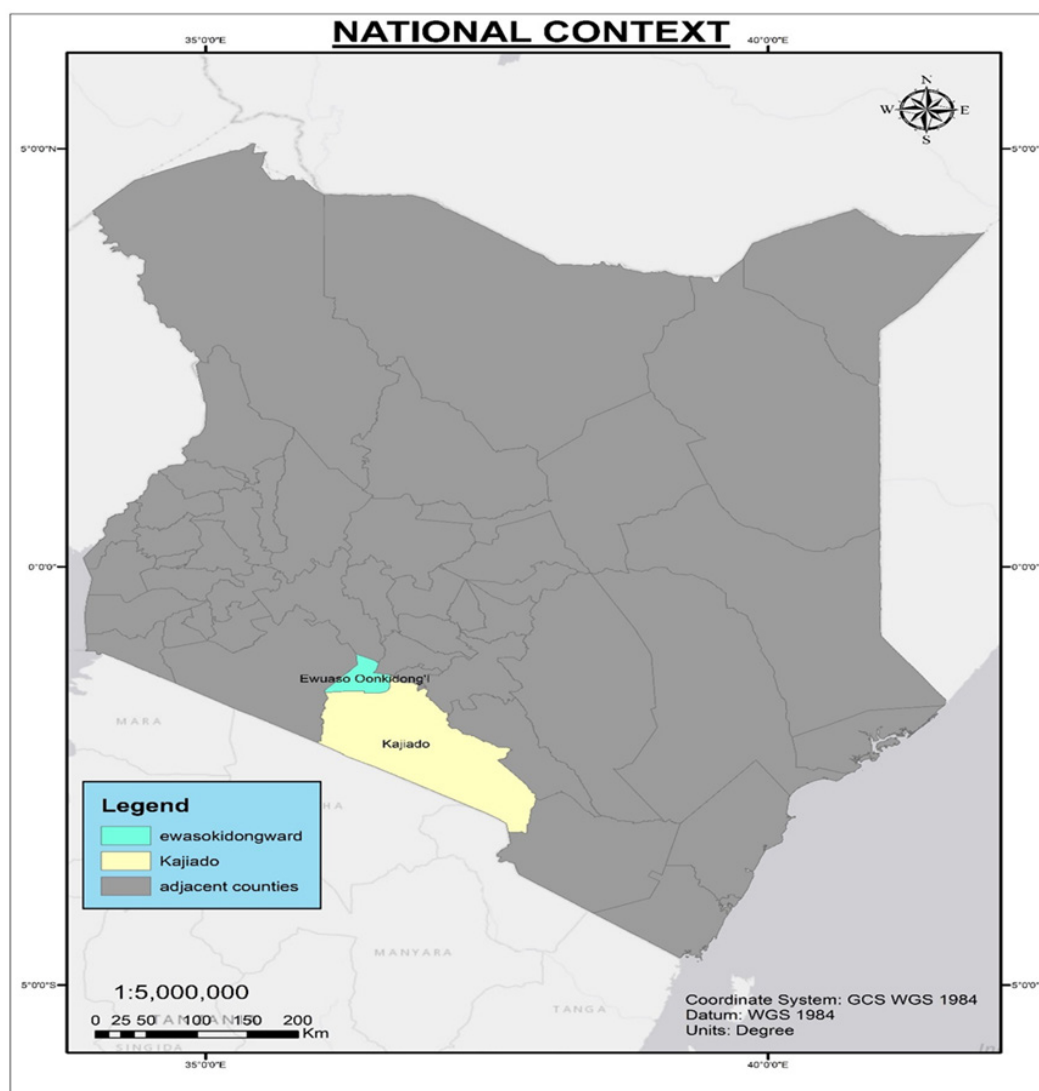


FIGURE 1

Location context of study area

Source: Adopted from the Kajiado CIDP, 2013-17

Data Collection

A semi-structured questionnaire comprises both closed- and open-ended questions (including multiple-response and dichotomous items) was administered to 100 household heads drawn from villages and centers in Kimuka, Ewaso, Enajooli, and Najile. The survey captured information on household characteristics, access to basic services, annual and primary sources of income, awareness of climate change, and adaptation and coping strategies.

In addition to the household survey, data were collected through key informant interviews with institutional leaders such as chiefs, assistant chiefs, ward administrators, teachers, health workers,

and land use planners. Direct observation of the physical landscape, facilities, and infrastructure was also undertaken and documented through maps, photographs, and field notes. Furthermore, Global Positioning System (GPS) technology was used to map critical facilities, including water points, administrative offices, schools, health centers, religious sites, and waste disposal locations.

Focus Group Discussions (FGDs)

In recognition of the cultural sensitivity surrounding resource use, and guided by Gray (2003), Focus Group Discussions (FGDs) were used to respect local perspectives and lived experiences. Clan leaders, chiefs, and elders

with long-standing knowledge of the region's climate, livelihoods, and socio-political dynamics participated. These discussions aimed to capture indigenous knowledge regarding climate variability, its impacts, and community adaptation and coping mechanisms.

Data Analysis

A multifaceted approach was adopted to analyze qualitative, quantitative, and spatial data. Quantitative analysis involved manipulating survey data to establish baseline conditions, project future requirements for land, population, and facilities, and illustrate socio-economic trends. Qualitative analysis was conducted through a thematic review of interview transcripts, descriptive remarks, expert observations, and photographic evidence. Spatial analysis entailed the digitization and updating of base maps to capture current infrastructure, facilities, and physiographic features.

RESULTS

Topography and Slope Analysis

The terrain of Ewuaso Oo'nkidongi Ward is largely

varied. The lowest altitude is approximately 500 meters above sea level at the Lake Magadi Conservation Project in the southern part of the ward, while the highest altitude reaches 2,460 meters above sea level at the Ngong Hills, located in the southeastern section. Another notable feature is Mount Suswa, a volcanic crater rising to 2,356 meters in the northern part of the ward. The land generally slopes from the northwest to the southeast, shaping the flow of major rivers such as the Ewaso Kedong River, which follows this direction. However, the river is experiencing severe degradation, including drying due to water diversions by private actors and deforestation along its catchment. The contrasting elevation — with Mount Suswa as the highest point and the Ewaso Kedong Valley as the lowest — defines the area's hydro-ecological system **Figure 2**.

Rainfall Distribution in Ewuaso Kedong'

The climate of Ewuaso Kedong' Ward is predominantly dry and hot, reflecting the semi-arid character of the region. The combination of low rainfall and the volcanic lavas forming the bedrock contributes to the fragility of the landscape.

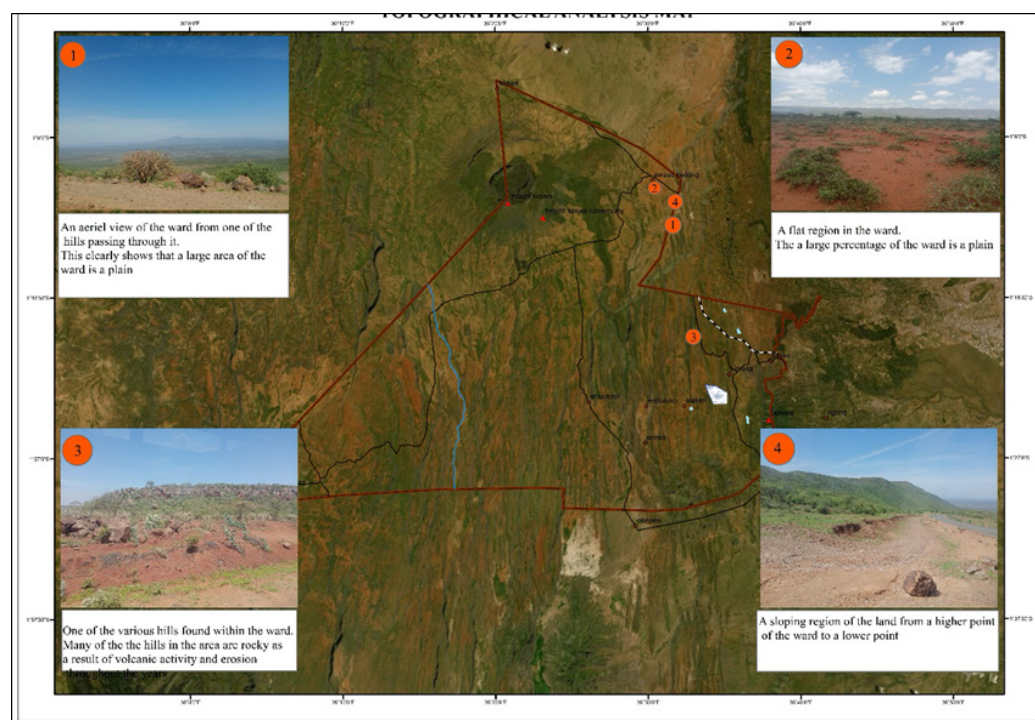


FIGURE 2

Topography of the study area

Source: Topographic-map.com. (2025)

Rainfall in the area is bimodal, consistent with patterns in much of Kenya, occurring during two main rainy seasons: March–May (long rains) and October–November (short rains). Despite this pattern, rainfall is often erratic and unreliable. The mean annual temperature is approximately 8°C, while average annual potential evaporation ranges between 1,650 mm and 2,300 mm, creating a significant water deficit.

Precipitation frequently occurs as localized, intense thunderstorms, which trigger flash floods. The southeast-facing slopes receive relatively higher rainfall due to their exposure to prevailing winds. However, the steep terrain, shallow soils, and exposed rocky surfaces result in rapid saturation and runoff, leading to swift downstream flooding.

During the dry season, the ward reverts to a distinctly semi-arid environment characterized by dust storms, water scarcity, and degraded vegetation cover. This seasonality underlines the vulnerability of the area's pastoral livelihoods to climatic variability and extreme weather events

Figure 3.

Vegetation Analysis

The vegetation of Ewuaso Kedong' Ward is diverse, consisting of both shrubs and grasses that reflect

the ecological variation across the landscape. On the flat and laga (seasonally flooded) areas, the vegetation is dominated by mixed or pure stands of *Trachomatous camphoratus* and *Acacia drepanolobium*, interspersed with grasses such as *Digitaria* species, *Themeda triandra*, and *Cymbopogon* species. The mountaintops, in contrast, support woody species including *Erica arborea*, *Dodonaea*, and *Merella salicifolia*. Along watercourses in the lowlands, stands of *Acacia xanthophloea* are common, indicating wetter soil conditions. In some upper parts of the ward, overtopping and siltation also support vegetation similar to that of the lowlands.

Despite pressures from farming and grazing, parts of the natural vegetation remain relatively intact, particularly grasslands dominated by *Acacia drepanolobium* and *Acacia kirkii*. The herbaceous layer is largely composed of *Themeda triandra* and *Pennisetum mezianum* in poorly drained areas, while *Cynodon dactylon*, *Sporobolus robusta*, and patches of *Cenchrus ciliaris* are also frequently encountered. Well-developed woodlands occur along the Kedong River Valley and around the Ketraco power station at Suswa, with additional patches extending upstream along the Ol Jorowa Gorge. Scattered remnant fig trees also remain in these areas, further contributing to the ecological

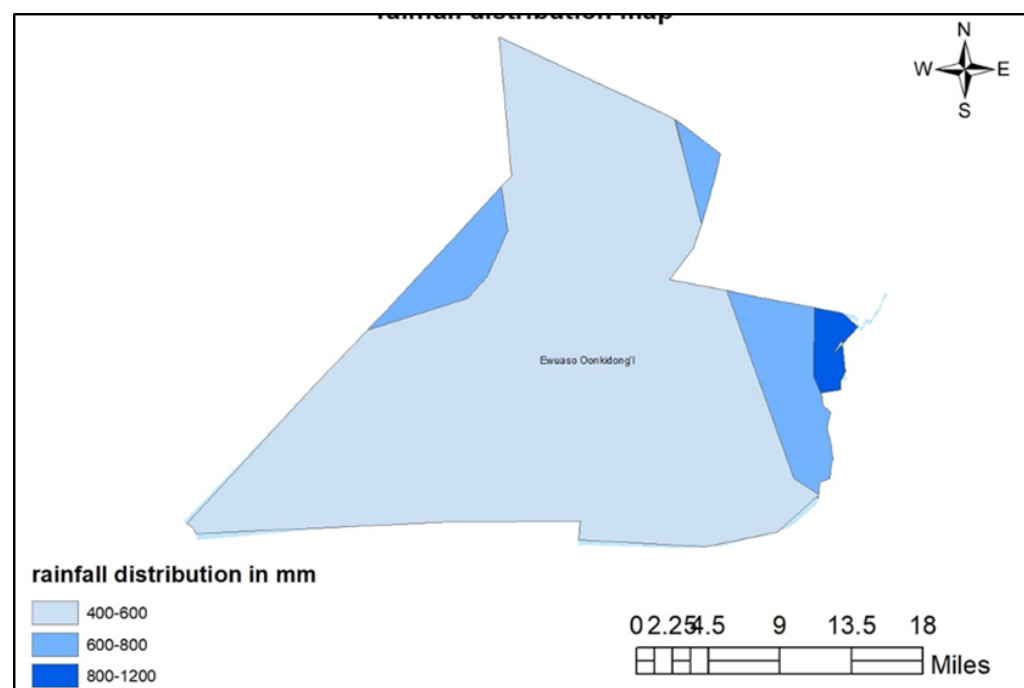


FIGURE 3

Rainfall distribution in study area

Source: Adopted from Kajiado CIDP 2013-17

diversity of the ward.

Land Tenure

According to local chiefs in Ewuaso Kedong town and Kimuka centre, most of the land in their areas of jurisdiction is privately owned, either as freehold or leasehold. Residential land is predominantly under freehold tenure, with a smaller proportion held on leasehold. Commercial areas are largely leasehold, with the exception of community-owned spaces such as the animal market and the open-air market in Ewuaso Kedong centre.

Survey findings indicate that 68 percent of households hold land under freehold tenure, while 21 percent occupy leasehold plots and 6 percent use community-owned land **Figure 4**. In terms of documentation, 58 percent of households reported having title deeds, whereas 23 percent lacked them. This distribution suggests that while a majority of residents possess relatively secure tenure, a notable proportion still face insecurity due to lack of documentation.

Economic Livelihood Activities

Livestock rearing is the dominant economic activity in the study area, reported by 76 percent of respondents. The major livestock types include cattle, goats, sheep, and donkeys, with donkeys mainly used for transporting goods. Cattle and goats are kept for both dairy and beef production, with beef breeds comprising primarily zebu,

Sahiwal, and Boran. The average household livestock holding is about ten animals, and pasture and browse conditions across the pastoral zone range from fair to good. Crop farming is undertaken on a small scale, largely because rainfall is seasonal and minimal.

In addition to livestock keeping, trade and commerce are important livelihood activities **Figure 5**. Residents engage in a range of small-scale enterprises, including retail shops, salons and barbershops, repair workshops, electronic shops, hotels and restaurants, health facilities, livestock veterinary outlets, farm produce shops, transport services, wines and spirits outlets, hardware shops, and carpentry. Despite this diversity, most business operators in Ewuaso Kedong earn less than 10,000 Kenyan shillings per month, reflecting low returns. The highest concentration of businesses is in barbershops, salons, and repair services, which account for about half of the reported enterprises.

Industrial activity in the area is minimal, as the majority of residents are primarily livestock keepers. The only significant establishments are local slaughterhouses, while light industries involve small-scale production of shoes, clothing, and accessories made from animal hides and skins, as well as beadwork and similar crafts. The rocky terrain has also facilitated the growth of quarrying activities. Stone mining is carried out on a small

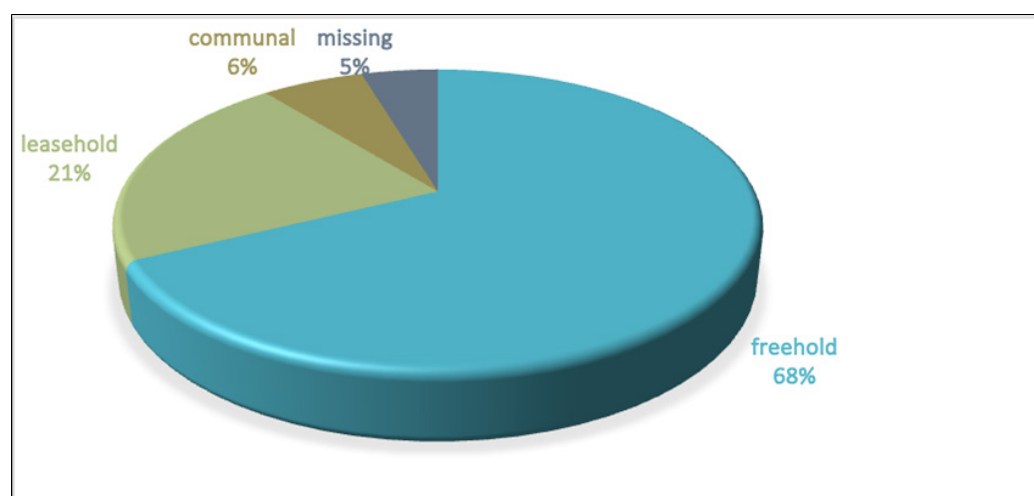


FIGURE 4

Household land tenure status

Source: Field survey, 2025

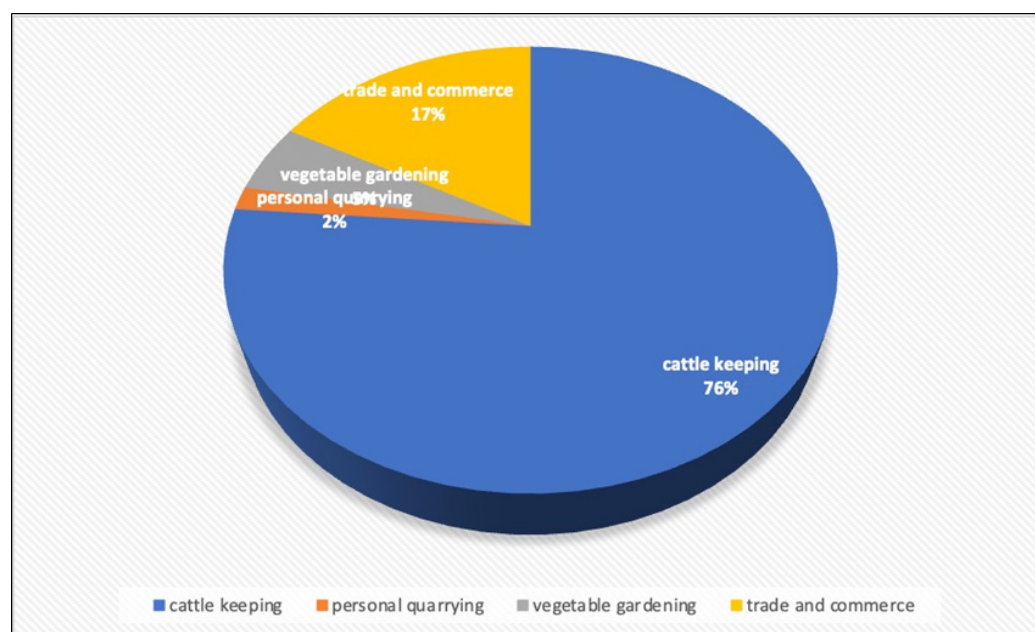


FIGURE 5

Household economic activities

Source: Field survey, 2025

scale, with several active quarries in operation, while others have already been exhausted and abandoned.

Implications of Research Findings on Community Resilience

The research findings highlight several factors that limit the resilience capacity of communities in Ewuaso Oo'nkidongi. A lack of marketing skills, low education levels, and an unfavourable policy environment restrict many pastoralists from diversifying their livelihoods. Access to education and training is limited; only about 40 percent of the population has attained primary education, 40 percent secondary education, and just 20 percent tertiary education. According to the chief of Kimuka location, the ward has four secondary schools, one college, and 44 primary schools. Even with these facilities, social-cultural norms, poverty, and accessibility challenges hinder many children from attending school.

Comparable to other ASAL areas, Ewuaso Oo'nkidongi experiences prolonged droughts that lead to acute shortages of fodder and water. These conditions damage the local economy and ecosystems, resulting in biodiversity loss, declining aesthetic value, and environmental pollution. Human activities such as illegal tree

fellings, charcoal production, and sand extraction exacerbate this fragility, while flash floods during the long rains intensify soil erosion and vegetation loss.

The ward's predominantly flat terrain is well-suited for pastoralism and nomadism, which remain the foundation of local livelihoods. However, the hilly areas surrounding Mt. Suswa Conservancy present opportunities for recreation and tourism, supported by caves and diverse wildlife that attract both domestic and international visitors. The higher-moisture zones around Mt. Suswa and Ngong Hills are particularly favourable for agricultural development focused on fodder production. Additionally, the extensive bare lands across the ward offer potential for plantation farming.

Land ownership and tenure arrangements play a crucial role in rural development and resilience. In Ewuaso Oo'nkidongi, land is held under three categories: public, private, and community. Survey findings indicated that 68 percent of households held freehold land rights, although only 58 percent possessed formal title deeds. Leasehold rights accounted for 21 percent, while 6 percent of land was community-owned. Secure and well-documented land ownership reduces disputes,

strengthens investor confidence, and creates opportunities for infrastructure development and improved livelihoods.

Land use planning requires careful analysis of both constraints and opportunities. For example, Mt. Suswa Conservancy—an ecologically significant forest and wildlife habitat—serves as both an opportunity for tourism and conservation, and as a constraint by limiting land available for settlement. The conservancy therefore plays a structuring role in shaping development recommendations and functions as a buffer zone against unregulated expansion.

Although the ward is located in a rain-deficient zone, it is crossed by seasonal rivers that swell during rainy periods. While floodwaters often cause destruction, they also present an opportunity to harvest water through ponds and pans. Consequently, rivers and riparian zones have been earmarked for conservation in this study's recommendations. The northeastern escarpment, characterised by steep slopes, is unsuitable for development but should be protected as an important forage reserve during droughts.

Land Use Planning Recommendations for Resilience and Livelihood Revitalization

Optimisation of Natural Resource Use through Controlled Development

Ewuaso Oo'nkidongi Ward is endowed with significant natural resources, including the Mt. Suswa Conservancy, sand, soil, rocks, natural forests, solar and geothermal energy, and large tracts of underutilized land. However, the expansive open landscape also allows for frequent human–wildlife interactions, leading to destruction of property and insecurity.

To address these challenges, the establishment of designated wildlife conservation zones and the creation of buffer areas in non-settled lands are essential. Such measures would reduce human–wildlife conflict and enhance environmental sustainability. At the same time, ensuring that natural resources are utilized efficiently and under regulatory frameworks will support economic development and community resilience.

The Mt. Suswa Conservancy presents untapped potential as a major tourist destination. Properly developed, it could generate employment

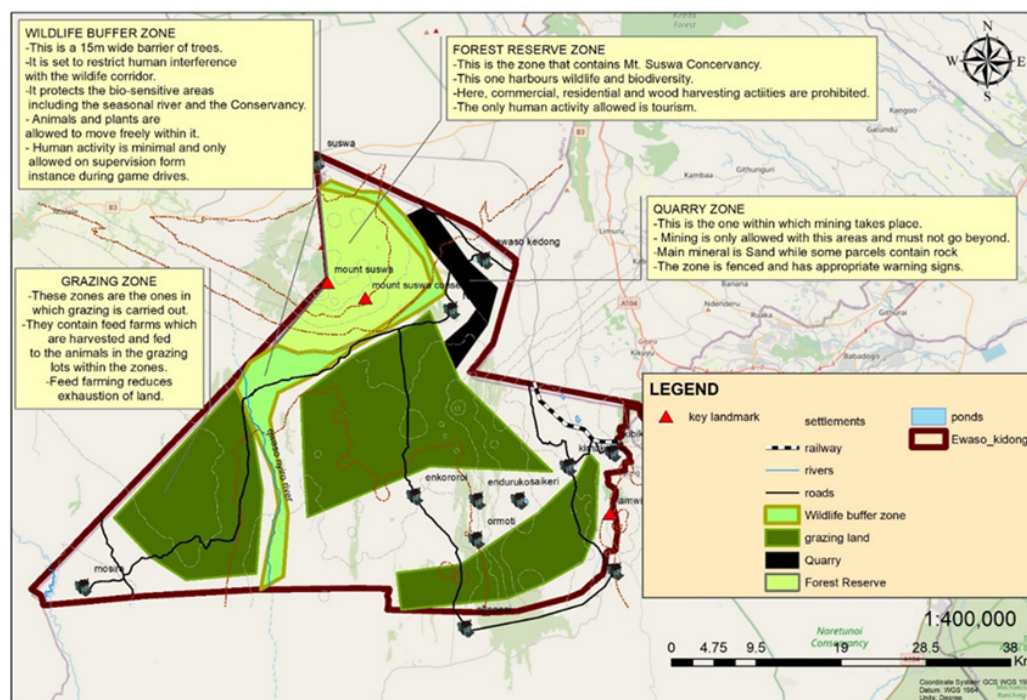


FIGURE 6
Optimisation of natural resource use through zoning
Source: Field survey, 2025

opportunities, stimulate local commerce, and contribute to county revenues. Similarly, the preservation of natural forests as public recreational areas would enhance community well-being and foster eco-tourism. In parallel, zoning parts of the ward into ranches for controlled livestock grazing would promote sustainable pastoralism, reduce land degradation, and ensure the long-term viability of the livestock economy **Figure 6**.

Revitalisation of Livestock Farming through Land Use Zoning

The proposal seeks to strengthen livestock farming by regulating the use of grazing land through clear zoning. Two main zones are recommended: an enclosed and regulated grazing zone in the eastern part of the ward, which has higher moisture retention capacity, and an open pasture grazing zone in the southwestern region.

In the enclosed grazing area, development control measures will be introduced, including setting minimum plot sizes. Specifically, livestock farming plots must be at least 2 acres.

This approach goes hand in hand with the recommendations of Tofu et al. (2023) in their

study of Ethiopia's Borena zone, which pointed out that governments can increase resilience among pastoral and agro-pastoral communities by improving rangeland productivity, ensuring water access, and diversifying income sources.

Similarly, Unks et al. (2019) argue that sustainable grazing should be "formalised through the elected grazing committee and includes continued formal restriction of a wildlife conservation area and management plans designed by conservation organisations to increase rangeland productivity."

This strategy therefore not only ensures better land management but also promotes sustainable pastoral livelihoods **Figure 7**.

CONCLUSION

Revitalising livelihoods in rural pastoral communities needs a concerted effort between both government institutions and communities. While land use planning tools offer a valuable framework, their effectiveness is largely dependant on integrating complementary strategies. These include the establishment of organisations or cooperatives to ensure access to affordable and

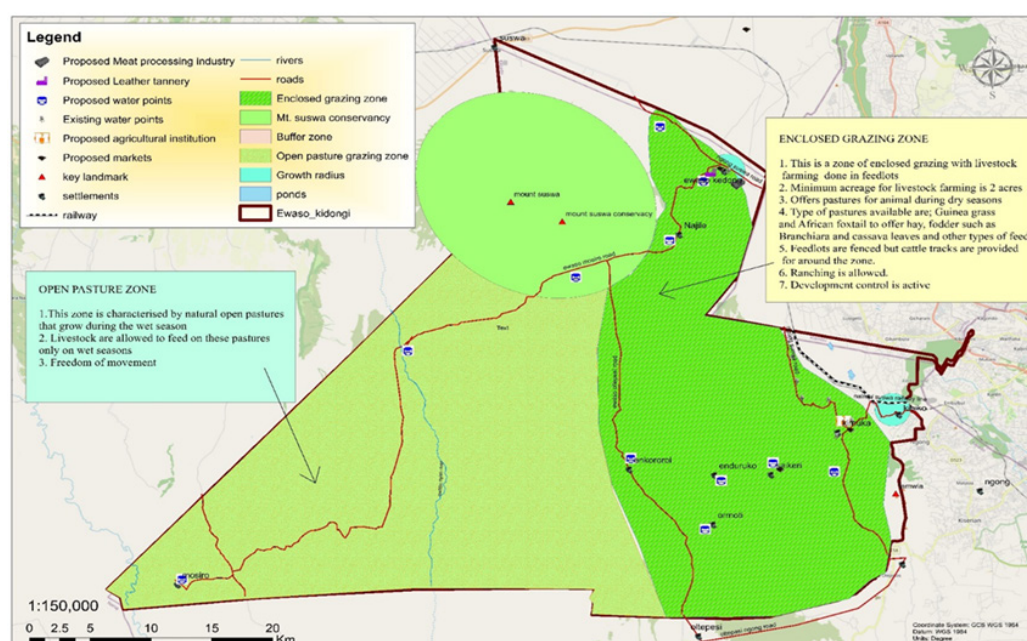


FIGURE 7
Zoning areas for livestock revitalisation
Source: Field survey, 2025

high-quality livestock feeds and nutrition, the introduction of certified veterinary services to support herders, and the creation of mechanisms to prevent and respond to disease outbreaks.

Equally important are active pasture management and environmental restoration initiatives, which will require communities to adopt significant changes in traditional practices. Community mapping of grazing areas is an essential tool for understanding mobility, access to resources, and the scale of support required. In addition, collective and communal activities should be prioritised over individual or household-level initiatives to build stronger resilience.

When implemented alongside land use recommendations, these approaches can significantly enhance pastoral livelihoods. More importantly, they also strengthen resilience and adaptability to the impacts of climate change, ensuring sustainable futures for pastoral communities.

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