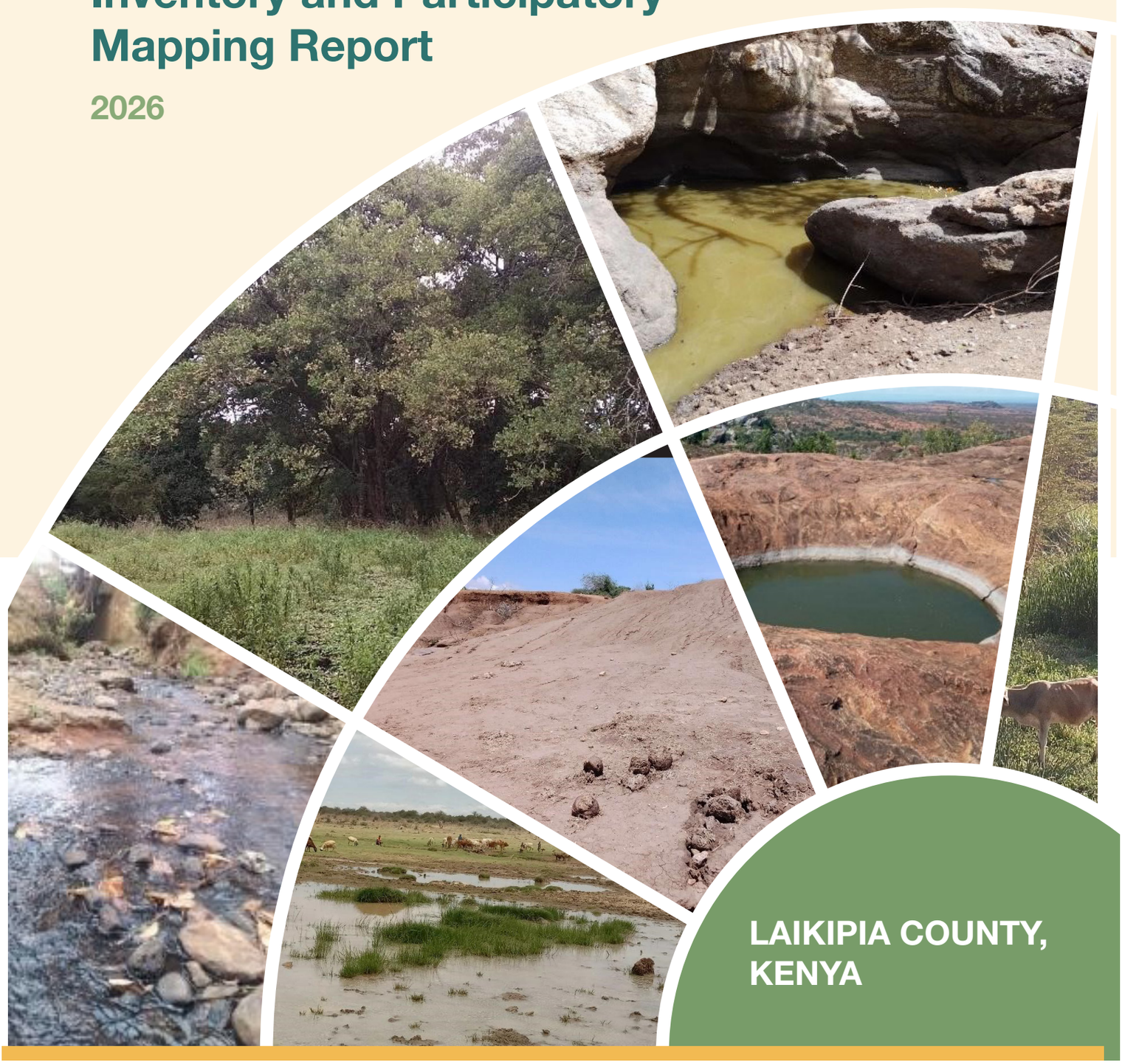
Dryland Natural Assets Inventory and Participatory Mapping Report

2026



LAIKIPIA COUNTY, KENYA

NATIONAL MUSEUMS OF KENYA
WHERE HERITAGE LIVES ON

CETRAD
Centre for Training and Integrated Research in ASAL Development

KENYA WILDLIFE SERVICE

SAVE THE ELEPHANTS

KENYA Forest Service

NRT
NORTHERN RANGELANDS TRUST

WYSS ACADEMY FOR NATURE

Dryland Natural Assets Inventory and Participatory Mapping Report

2026

LAIKIPIA COUNTY,
KENYA

Foreword

Laikipia County, situated in Kenya's arid and semi-arid lands (ASALs), is endowed with a rich mosaic of dryland natural assets that are central to the livelihoods, culture, and resilience of local communities and associated landscapes. These assets, consisting of seasonal rivers, laggas, water pans, wetlands, salt licks, and islands of dense vegetation, pasture, rock catchments and springs, wildlife, biodiversity and genetic resources, support rural livelihoods, pastoralism, agro-pastoralism, wildlife conservation, and the broader ecological balance of these landscapes.

In the face of increasing climate variability and changes, land pressure from competing developmental needs, and resource-based conflicts, it has become essential to understand, document, and protect these critical resources through locally grounded, evidence-based, participatory and multi-stakeholder inclusive assessments, planning and policy development. This **Dryland Natural Assets Inventory and Participatory Mapping Report, the first of its kind in Kenya** and perhaps the continent, represents a significant step in this direction that not only provides the evidence but also establishes the urgent need to secure and protect the vital assets for posterity and sustainable development.

Through a participatory and multi-stakeholder approaches, this report documents over 200 dryland natural assets across the county. Community elders, conservancy leaders, youth, women and men as well as spiritual and political leaders and technical officers came together to share knowledge and experiences, validate the assets and their locations, assessed the status and management priorities and concerns of the key assets in the county. The insights captured here are not only spatially accurate but deeply embedded in the lived experiences, indigenous knowledge and socio-cultural connectivity of Laikipia people and their landscape resources.

The report further provides a clear picture of management arrangements—highlighting areas of strong community and natural resources stewardship as well as the inherent gaps and threats affecting the natural resources under unprotected areas; with weak governance systems. It lays the groundwork for informed decision-making by the Governments both at the county and national levels, communities, development partners, conservancy owners, and independent commissions to support collaborative and multi-stakeholder inclusive processes, efforts and mechanisms for the sustained management and conservation of vital natural assets in these natural-capital rich areas.

Consequently, this report serves as a vital tool for base-lining and for enhancing **natural resource planning, climate adaptation and resilience building, conflict mitigation, and sustainable land use management practices through landscape connectivity and protection of natural assets.** It aligns with Laikipia County's commitment to inclusive development, devolution, and the recognition of communities as custodians of their landscapes and the resources therein. Let this report be a steppingstone towards better stewardship of Laikipia's dryland ecosystems for current and future generations.

Dr. Abdillahi Saggaf Alawy
Chairman
National Land Commission

Acknowledgments

This report is a culmination of a highly consultative, inclusive and collaborative process that brought together local communities, their leaders, technical experts, and development partners to identify, map and assess Laikipia County's dryland natural assets for purposes of informing their sustainable conservation, use , planning and decision-making. Its completion would not have been possible without the commitment, dedication, sound technical knowledge and financial support, and contributions of many individuals and institutions.

As a Commission, we cherish partnership and leverage strategic opportunities and collaborations to discharge our mandate which is enlisted under the Constitution and relevant land statutes. We extend our sincere appreciation to the people of Laikipia County—particularly the elders, youth, women, political leaders, and conservancy representatives—whose deep understanding of the landscape provided the foundation for this mapping exercise. In addition, the National Government through the relevant ministries, departments, and agencies (MDAs), provided immense support in sharing knowledge, data and expertise that guided the Commission in delivering this critical output. Your willingness to share insights, guide field teams, validate data and information, is highly appreciated

We are particularly grateful to **WYSS Academy for Nature** whose financial and technical support became handy in documenting these assets in the face of the on-going community land registration processes and climatic changes; and this report will help the land adjudication team at the County and National Governments to secure the assets in the community land registers, spatial plans and institute development control ventures towards their protection and sustainable use.

Special thanks go to the **County Government of Laikipia,** represented by both the executive and legislature for their invaluable support, availability and providing policy guidance, technical support/guidance, community mobilization and field participation exercises throughout the process. Your leadership ensured that the findings of this report informs the ongoing county spatial planning, community land registration/adjudication and development priorities of the County.

We also acknowledge the valuable input of **national agencies**, including the County Commissioner of Laikipia whose support in mobilizing the national administration, local communities and their elders, helped ensure technical accuracy, embeddment of local knowledge and relevance of this project.

We recognize and thank the **technical team that was coordinated by the Commission and included** GIS specialists and field mapping teams for their dedication and rich tapestry of expertise that guided and mid-wifed the entire mapping exercise and the report hereto. Your commitment to this participatory and community-centred processes has helped ground this report in both science and local knowledge.

Finally, we thank CETRAD for the technical support and all those who worked behind the scenes—data collectors, report writers, GIS analysts; and communication teams from both Wyss Academy and the Commission, as well as administrative staff—who ensured the success of this initiative.

This report is not only a record of Laikipia's rich natural endowments but also a testament to the power of collaboration and local stewardship in managing and protecting our dryland resources. The methodology and approaches adopted in this project is highly scalable and will be used to inform other dryland counties natural assets mapping, going forward. I invite everyone to pay keen attention to the findings of this report and ensure the protection and security of dryland assets in this County is guaranteed under various existing legal regimes and that there is a proper balance of rights between nature and people.

Kabale Tache Arero, MBS
Secretary/Chief Executive Officer
National Land Commission

Preface

The arid and semi-arid lands (ASALs) of Kenya, including Laikipia County, are uniquely endowed with natural resources that are central to the survival, resilience, and identity of pastoralist communities. Despite harsh climatic conditions and recurring droughts, the people of Laikipia have for long time, sustained their livelihoods through deep ecological knowledge, mobility, and strong customary resource governance systems.

Over time, however, these natural assets which include seasonal rivers, water pans, wetlands, salt licks, vegetation islands, springs, and rock catchment, have come under immense threat and pressure from climate change, land use change, population growth, and competing demands. In many cases, the absence of formal data, maps, or recognition of community-managed resources has further hindered planning, protection, and investment. The on-going community land registration process is likely to compound the challenges further by placing the vital community and public assets into private hands/entities. It is therefore important to exercise caution and be proactive, rather than reactive, in the conservation, sustainable use and development of dryland assets and the landscapes in order to prevent current and future natural resource-related conflicts and bad governance, occasioned by unplanned and unsustainable resource use and exploitation.

The Laikipia *Dryland Natural Assets Inventory and Participatory Mapping Report* was developed in response to this gap. It seeks to document and spatially map key dryland resources while also capturing the diverse management structures, governance gaps and challenges, and opportunities for their sustainable use and conservation. The process was designed to be fully participator and community-centric, informed by indigenous and traditional knowledge systems, and supported by county, national government and technical actors.

This report reflects the outcomes of a rigorous and extensive fieldwork, stakeholder dialogues, GIS mapping, and local and national stakeholder validation exercises. It is intended to serve as a **planning and policy tool** for the County and National Government, a **resource management guide** for conservancies and traditional land governance and a **learning resource** for development partners and researchers interested in dryland resilience and community-based natural resource management and governance.

We hope that the information and insights contained in this report will help bridge the gap between local knowledge and formal systems, enabling better protection, planning, and restoration of Laikipia's dryland ecosystems.

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List Of Abbreviations

ASALs	Arid and Semi-Arid Lands
CSP	County Spatial Plans
LAPSSET	Lamu Port and Lamu-Southern Sudan-Ethiopia Transport
HoAGDP	Horn of Africa Gateway Development Project
MDACs	Ministries, Departments, Agencies and Counties
CETRAD	Centre for Training and Integrated Research in ASAL Development
ESRI	Environmental Systems Research Institute
GIS	Geographic Information Systems
STE	Save the Elephants
NLC	National Land Commission
CIDP	County Integrated Development Plan
MTP	Medium Term Plan
NLIMS	National Land Information Management System
STA	Storytelling Approach
KFS	Kenya Forest Service

1. BACKGROUND

1.1 Global Outlook of Drylands

According to UNCCD, drylands cover approximately 40% of the world's land area, and support two billion people, 90% of whom live in developing countries. Found on all continents, but being most prevalent in Africa and Asia, drylands are the foundation for both rural and urban communities. Around one billion people rely directly on dryland ecosystem services for their daily survival, whether through rain-fed or irrigated farming, or through widespread pastoralism. Table 1 summarizes the global statistics for the four types of dryland.

Table 1: Global figures for the four types of drylands

Dryland sub-habitat	Aridity index*	Share of global area (%)	Share of global population	% rangeland	% cultivated	% other (including urban)
Hyper-arid	<0.05	6.6	1.7	97	0.6	3
Arid	0.05 - 0.20	10.6	4.1	87	7	6
Semi-arid	0.20 - 0.50	15.2	14.4	54	35	10
Sub-humid	0.50 - 0.65	8.7	15.3	34	47	20
Total		**41.3**	**35.5**	**65**	**25**	**10**

** The ratio of precipitation to potential evapotranspiration.*
Source: Safriel et al. 2005

Dryland degradation costs developing countries an estimated

4–8%

of their GDP each year.

Unsustainable land and water use and the impacts of climate change are the major drivers of degradation of drylands. Approximately 6 million km2 of drylands (about 10%) bear a legacy of land degradation. Such degradation – sometimes also referred to as 'desertification' – can take the form of soil erosion, nutrient depletion, water scarcity, altered salinity or the disruption of biological cycles. Degradation reduces biological productivity and can impact the ability of ecosystems to absorb and use rainwater. Combined with poor crop and soil management, and the use of poorly adapted varieties of crop, this can lead to 'agricultural droughts'.

Dryland degradation costs developing countries an estimated 4–8% of their national gross domestic product (GDP) each year. It is estimated that about 1–6% of dryland human populations live in desertified areas (UNEP, 2011), while a much larger number is under threat from further desertification. Land degradation and poverty are mutually reinforcing, but the former has low political visibility. It is hard to deal with the problem due to cyclical swings in rainfall, land tenure which is not well adjusted to environmental conditions, and regional and global forces driving local management. Inaction would mean a cumulative addition to a long, historical legacy of degradation, from which recovery has already previously proven difficult.

Drylands offer opportunities for local populations and provide regional and global benefits. The biodiversity of drylands provides ecosystem services benefit local communities. Dryland forests and woodlands provide shade and moisture, are home to pollinators, protect nutrients, are fire resistant, and reduce water runoff, erosion and flooding. Life in drylands has evolved with the variable and extreme climatic conditions that present here, and includes a relatively high number of endemic species. These species represent genetic resources of importance, in particular, for adaptation to future climate change. Unique ecosystems, such as deserts (e.g. Sinai, Namib and Chihuahua deserts), steppes (e.g. Mongolia), savannas (e.g. East Africa) and drylands wetlands (e.g. Nile Delta and Okavango Delta), represent opportunities for ecotourism.

Drylands can have major global climate benefits: dryland carbon storage (mainly in the form of soil carbon) accounts for more than one third of the global stock. Drylands also have the potential to sequester more carbon than they currently store as they are far from saturated. Yet despite these potential benefits, current projects under the Clean Development Mechanism (CDM) of the Kyoto Protocol are limited to methane capture, waste management and renewable energy. Dryland forests in México store carbon at roughly the same rate as evergreen forests. Thus, the establishment of dryland forests, coupled with dune stabilization, savannization and rain-fed dryland agroforestry, can increase carbon storage. However, the capacity to store carbon depends on many factors including climate, history, past land use, and opportunity for management change.

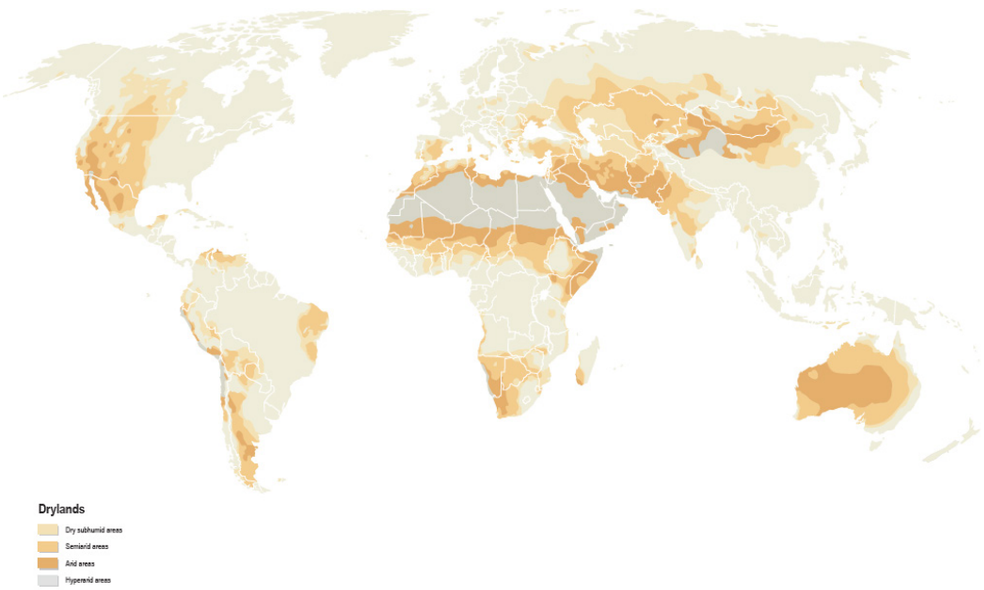
The potential local, regional and global benefits of drylands have not been fully utilized because of myths, market failures, a lack of public goods such as adequate infrastructure, weak incentives, high investment costs and gender inequalities. Dryland ecosystems and populations face a number of risks and costs including tenure insecurity, conflict, variable weather, scarcity of human capital and high transaction costs. In many areas, often the women (UNEP, 2011) manage the natural resources and hold knowledge of indigenous production methods, plant species and their various uses (including medicinal uses). However, women rarely own the land that they manage and, without assets, cannot access agricultural credit or extension services. On the other hand, the participation of women in often profitable trade counters this situation to some extent.

Opportunities for increased investments in drylands are coupled with global and regional trends; and include:

- Fulfilling food security commitments (at least US$20 billion2), in part, through the rehabilitation of the drylands resource base.
- Targeting private investment – which is often transnational – in food security, natural products, key infrastructure and services towards dryland resources.
- Targeting renewable energy opportunities within drylands.
- Utilizing funds for conflict prevention and post-conflict rehabilitation to restore dryland resources.
- Supporting access for women to productive assets.
- Using climate change instruments designed for mitigation (soil carbon, bioenergy) and adaptation (small business development and home gardens and sheep) in vulnerable dryland areas.
- Encouraging research into adaptation.
- Conserving high value dryland biodiversity, such as drought resistant or heat tolerant crop and livestock varieties.
- Targeting cultural and eco-tourism opportunities within drylands as well as mining and the whole potential for 'secondary' (e.g. transformation and conservation industries) and tertiary (e.g. micro-credit and banking, telecommunication, market, etc.) sectors.

Opportunities for investment in drylands exist for the public sector, the private large-scale commercial sector, the community sector, and the household or small-scale private sector. As regards to the degradation of drylands, the result of failure to prevent dryland degradation is often the need for relief and aid; this is costly in economic terms, but even more so in terms of human suffering. This cost can be reduced by engaging dryland communities in the development process. Investments can be directed towards areas such as communications; renewable energy; education; health; water; farmland, rangeland and livestock; woodland and trees; land use; conservation and tourism; urban development; markets; innovation; and risk management. For many investment areas, there are multiple opportunities for different actors and collaborations between actors. Figure 1 shows the Distribution of global drylands.

Figure 1: Distribution of global dryland Source: UNEP World Conservation Monitoring Centre, 2010



1.2 Regional Outlook

According to the Global centre for Adaptation (GCA), nearly a third of global drylands occur in Africa, where they cover 19.6 million square kilometres (km2), and nearly two thirds of southern, western, eastern and northern Africa (Figure 2). This area is home to over 525 million people in Africa (40 percent of the population), growing by about 3% per year (faster than the African average of around 2.5 percent), with a demography firmly skewed toward the young (GCA, 2021).

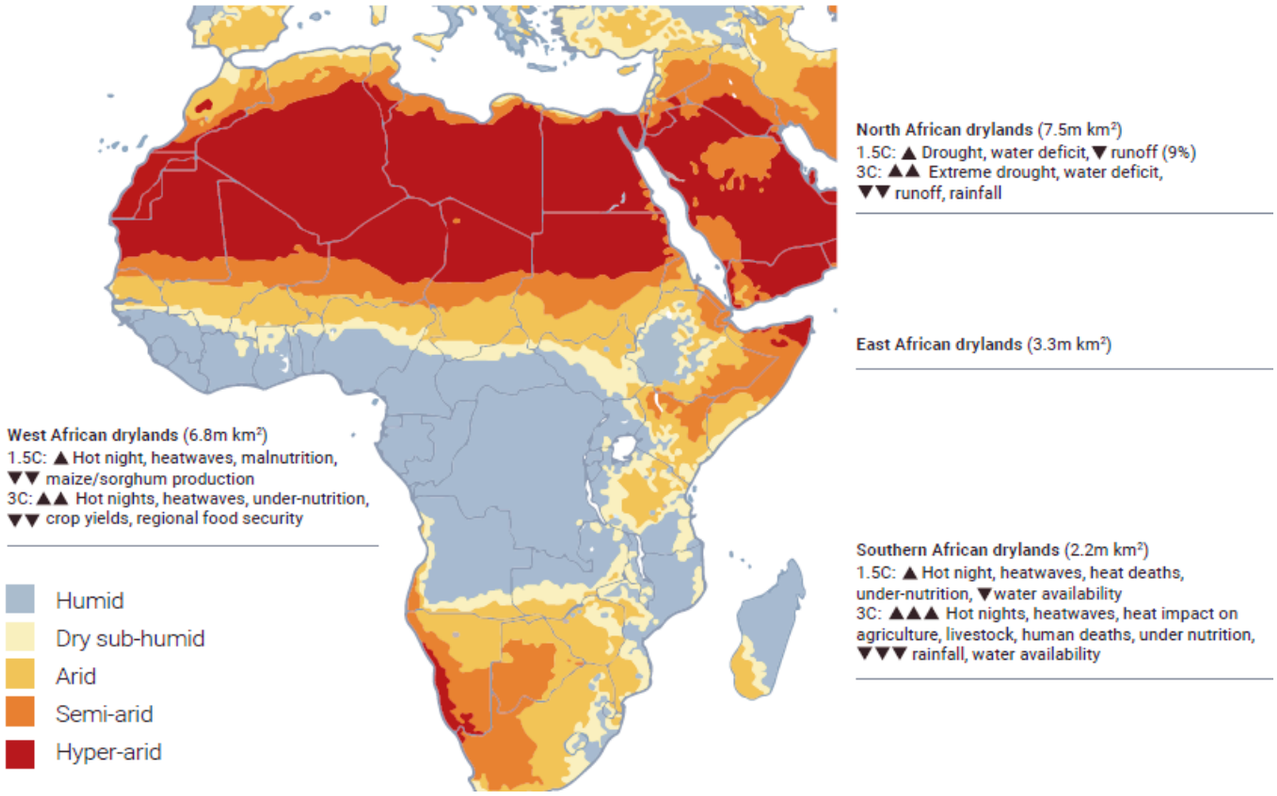


Figure 2: Africa Drylands Cover (Source: IPCC, 2019).

Biophysically and socially, the drylands are diverse (Table 2). Biomes range from woodlands and savannas on either side of central Africa's equatorial forests, to Mediterranean shrublands in the north and south, and enclosing the hyper-arid Sahara in northern Africa and the smaller Namib in the south. This diversity means that the details of livelihoods are very context specific, but land use is broadly dominated by nomadic, transhumant or sedentary pastoralism, rainfed cropping and agroforestry, and localized areas of irrigated farming; the livelihoods of over 200 million people in Sub-Saharan drylands depend on cropping.

Economically, About 69% of the rangelands in developing countries are used for livestock production and contributes 10% of global meat production. Livestock production in rangelands accounts for between 50% and 80% of agricultural gross domestic product (GDP) in developing countries. Besides supporting most of the livestock population that contribute 10% – 50 % of the individual countries' agricultural GDP in the Horn of Africa, these areas provide various plant and animal resources, minerals and oil. Because of their global extent and diversity of ecosystem goods and services they supply, often beyond their boundaries, rangelands condition and trends are linked closely to the economic well-being of many communities and hence their sustainable management and conversely their degradation are of critical importance to mankind.

Table 2: Key characteristics differentiating drylands in Africa (FAO, 2019).

North African drylands	
Area: 7.5 million km² (4.6 million hyper-arid), 99% of region	
Major land uses: Grassland 9%, Wooded 3%, Crops 7%, 'Barren land' 77%, Urban <1%	
Out migration 1970s/2000s: 140,000/319,000 people per year	
West African drylands	**East African drylands**
Area: 6.8 million km² (2.1 million arid), 53% of region	**Area:** 3.3 million km² (1.1 million dry sub-humid), 47% of region
Major land uses: Grassland 12%, Wooded 24%, Crops 8%, 'Barren land' 51%, Urban <1%	**Major land uses:** Grassland 25%, Wooded 44%, Crops 6%, 'Barren land' 12%, Urban 1%
Out migration 1970s/2000s: 224,000/508,000 people per year	**Out migration 1970s/2000s:** 152,000/241,000 people per year
Southern African drylands	
Area: 2.2 million km² (1.4 million semi-arid), 84% of region	
Major land uses: Grassland 28%, Wooded 59%, Crops 4%, 'Barren land' 7%, Urban 1%	
Out migration 1970s/2000s: 5,000/17,000 people per year	

Further to be above, rangelands in Africa have become the new frontiers for development; as Africa's population grows, rangelands serve as sinks for the immigrant population from the agriculturally high potential areas. In addition, with infrastructure development, and expansion of urbanization, towns located in the rangelands now act as business hubs that link the frontiers to the rest of the countries. Given their immense contribution to local, national and regional economies, achievement of food security and climate change mitigation and adaptation, squarely depend on how best we manage the vast drylands. Despite their economic and ecological importance, rangelands are under constant threat from among other factors, land use and land tenure changes that result in injudicious use and subsequent range degradation, as well as lack of appropriate policies or weak implementation where they exist. Climate change adds another layer of challenges to the problems already facing rangelands.

Economically, About **69%** of the rangelands in developing countries are used for **livestock production** and contributes **10% of global meat production.**

1.3 The National Outlook

Kenya has an area of approximately 582,646 sq. km. comprising

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2.2%
water surface

The Republic of Kenya comprises the territory and territorial waters. It has an area of approximately 582,646 sq. km. comprising 97.8% dry lands/ASALs (Figure 3) and 2.2% water surface (National Atlas, 2024). It is estimated that 20% of the land of the dry land area is medium to high potential land and the rest (80%) of the land is mainly drylands-arid and semi-arid lands (GoK, 2012). The widespread and deeply rooted misconception that drylands are "wastelands" neglects the magnitude of existing social, economic activity and related environmental benefits. Contrary to this misconception, these are some of the region's untapped potential according to the Vision 2030 Development Strategy for Northern Kenya and other Arid Lands, justified by the following:

1. **Strategic position:** The region's geographical location and its social and cultural attributes make it well-positioned to benefit from surplus capital in the Gulf, one of the fastest-growing parts of the world. It is also the bridgehead to a regional economy of more than 100 million people. Countries such as Ethiopia, Sudan and Somalia need outlets for their products, imports of manufactured goods and, in the case of South Sudan and Somalia, materials for reconstruction.
2. **Domestic trade:** The economies of the lowlands and highlands are complementary. Opening up the north will generate greater demand for Kenyan products. There is already significant movement of capital between parts of the north and Nairobi, which is set to grow.
3. **Livestock trade:** As populations increase, urbanize and become richer they create more demand for meat and other livestock products. The ASAL regions host 70% of the National Livestock herd with an estimated value of Ksh.70 billion.

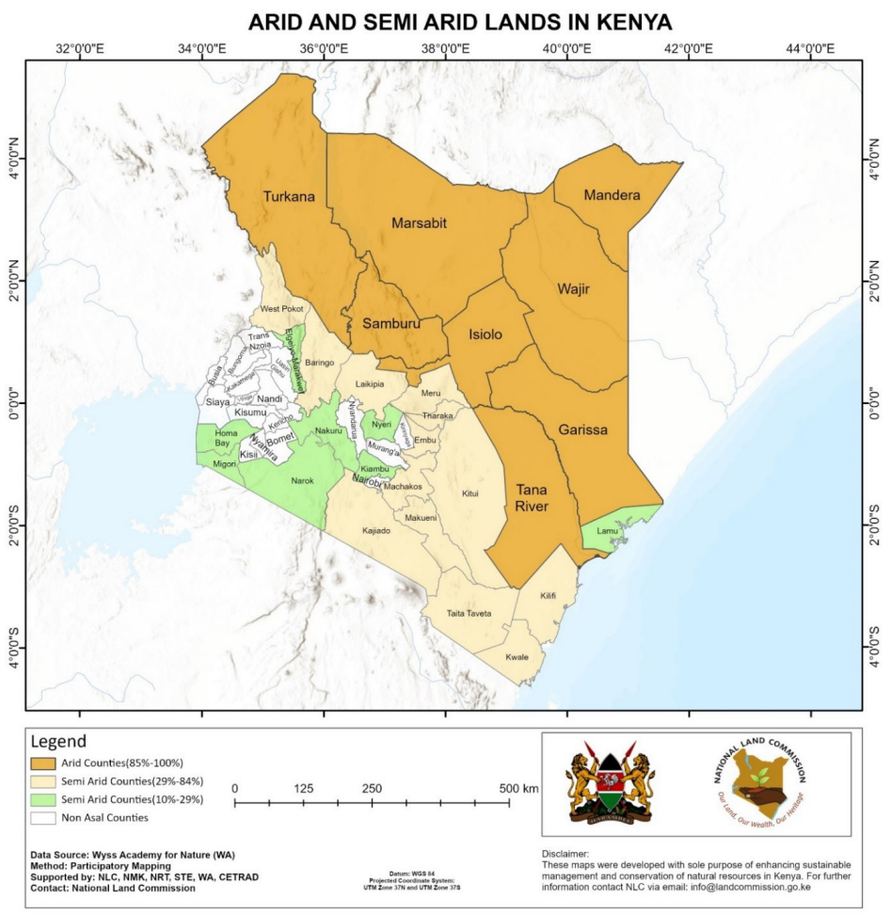


Figure 3: Kenya ASAL Counties

4. **Tourism:** Most protected areas such as game reserves and national parks are found in the ASALs. This gives the region a comparative advantage in tourism, an industry that is usually Kenya's highest foreign exchange earner and contributes approximately 12% to Kenya's GDP. Pastoralism, conservation and bio-diversity are intimately linked.
5. **Natural wealth:** if Kenya has commercial deposits of oil and natural gas they are likely to be found in the ASALs, particularly in the north and east. Other natural resources include sand and gravel for construction, a wide range of precious minerals, soda ash, gums, resins, and medicinal plants. Dryland soils and vegetation store carbon, suggesting that the ASALs have the potential to generate payments for environmental services such as carbon sequestration.
6. **Urban development:** Carefully planned and strategic urban development in the ASALs will benefit the region, particularly in terms of employment creation, while also opening up new economic and investment opportunities for the country as a whole, reducing population pressure in high-density areas and strengthening national cohesion through the inter-mingling of social groups.
7. **Climate change:** Pastoralists have to a large extent successfully managed climate variability for centuries. Their skills and knowledge will become more valuable as the impact of global climate change becomes more pressing.

1.4 What are Natural Assets?

Natural assets, as defined by the Organisation for Economic Co-operation and Development (OECD), comprise the biophysical components of the environment, including biological resources, land and water ecosystems, subsoil resources, and the atmosphere (OECD, 2008). This definition captures the tangible, ecological dimensions of natural systems that support human and non-human life. However, natural resources become assets when people have rights to access their benefits (Boyce, 2001).

In light of decolonial critique, natural assets are understood not merely as biophysical resources with economic value, but as relational entities embedded within Indigenous and local worldviews, cosmologies, and territorial rights (Escobar, 2020). This perspective challenges the colonial and anthropocentric conception of a natural asset as a repository of resources to be owned, extracted, and monetized. When viewed through a cultural lens, however, natural assets embody meanings that go beyond their physical or economic utility. They encompass ecological entities and landscapes—such as land, wetlands, water, biodiversity, forests and minerals —that are valued not merely for their instrumental function, but for their cultural, spiritual, historical, and relational significance, as articulated within indigenous and local knowledge systems (Whyte, 2018). In this context, a natural asset is understood as something that holds value due to its role in sustaining community livelihoods, knowledge systems, cultural identity, and collective wellbeing (Green, 2015; McPherson et al., 2020).

The boundaries between natural resources and culture are often indistinct. Scholars have emphasized that natural and cultural heritage are inextricably linked, co-producing landscapes and meanings that foster a shared sense of place (Cheng et al., 2003; King & Willow, 2011; Speed et al., 2012). Lockwood and colleagues go further to argue that the interdependence of cultural and natural dimensions is so profound that they are best managed as a unified whole (Lockwood et al., 2006). Doing so not only reflects the dynamic interplay between people and their environments but also enhances the efficacy and sustainability of development interventions (Hossen, 2016; Mere-Roncal et al., 2021).

Categorisation of natural assets in participatory approaches often mirrors the cultural landscapes and socioecological realities of the communities involved. In northern Kenya, for instance, participatory mapping exercises conducted with pastoral communities revealed classifications of natural assets that closely reflected the intimate local pastoralist practices and wildlife conservation, and embodied their knowledge systems, mobility patterns, and livelihood strategies.

In Kenya,

80%+

of the land surface including the ASALs is fragile and has a population of

16 Million+

people

The annual cost of land degradation in this areas is estimated to be about

1.5 Billion USD,

which is equal to the Country's 5% GDP

1.5 The Need to Map Drylands Natural Assets

1.5.1 Securing Natural Assets for Poverty Reduction & Socio-Economic Development

In Kenya, over 80% of the land surface including the ASALs is fragile and has a population of over 16 Million people, categorized as poor (living below line) and suffer effects of widespread aridity, acute food and water shortage, as well as general insecurity (Mulinge et al. 2016; Range Management and Pastoralism Strategy 2021-2031). The annual cost of land degradation in this areas is estimated to be about 1.5 Billion USD, which is equal to the Country's 5% GDP (Nkonya et al, 2016; UNSD 2016).

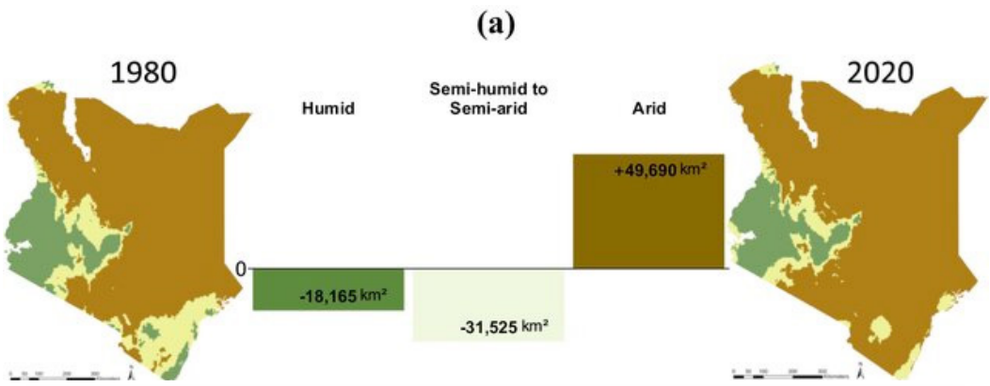
Dryland natural assets are intimately linked to poverty. Local communities depend on these assets for their livelihoods and survival. Despite the rich assets hosted in the dryland landscapes and the fact that they constitute important natural assets that spur socio-economic development, these areas continue to face ecological 'marginalization' and neglect from mainstream ecosystems. First, the true worth and full potential of dryland natural assets have not been explored and documented to provide tangible evidence for policy, planning, sustainable management and decision-making. Further, the skewed interpretation of the contribution of natural assets in Kenya's economy is partly attributable to lack of adequate data and research on their economic value and hence their lack of placement in economic and social planning instruments.

This dryland natural assets inventory and participatory mapping report (2026) for the Kenya's drylands, is the first of its kind in Africa that authoritatively documents and inventorizes dryland natural assets. Kenya´ s drylands are endowed with vast and diverse natural resources including biodiversity and genetic, land and unique ecosystems. These vital assets (hills and mountains, valleys, rivers, lakes, forests and wildlife, varied weather and climatic regimes), are indeed key pillars of socio-economic development in the Country. They are the suppliers of ecosystem services such as water, energy, biomass, medicine, food, income and revenue both at the household and community- level.

Mapping and inventorizing dryland natural assets is the first step towards securing them and achieving posterity by influencing the envisaged land cadastres', plans and policies at county and national level and enhance their protection and survival for continued accruing benefits and creation of wealth and green jobs. In this regard therefore, the National Land Commission (hereinafter referred to as the Commission) with support from her partners - WYSS Academy for Nature and CETRAD alongside other government agencies and non state actors, embarked on county-based mapping and inventory of natural assets of dryland areas in Kenya, with Isiolo, Laikipia and Samburu being pilot counties. The mapping project aimed to provide evidence for instituting measures for their protection and conservation; and in particular, advancing the development of transformative policy changes for natural resources governance, conservation and sustainable use. Therefore, this report presents the outcomes of Natural Assets mapping in Laikipia County.

1.5.2 Shifting Climate Zones in Kenya (1980–2020)

Kenya's climatic zones are significantly changing due to many factors, but majorly, human-driven. Human-induced climate change pressures significantly alters the spatio-temporal characteristics of climate zones, which drives agricultural land use and ecosystem change. However, the detectability of shifting climate zones and the rate and time of the changes is yet to be adequately addressed at the regional and local scale. Studies by Ted et al. , 2023 on the shifting climate zones and expanding tropical and arid climate regions across Kenya (1980–2020) observed an approximate 1 °C increase in average annual temperature over the 40-year period (Fig 4). Consequently, a total of 76,346 km2 shifted from cooler to hotter zones, while 1298 km2 shifted from hotter to cooler zones. These dramatic changes are largely experienced in the drylands, increasing their fragility and inability to provide the resources and benefits therefrom; and negatively impacting socio-economic and ecological development in these areas.



Precipitation Zones	Average Precipitation (mm)	Climate Region Designation	1980 (km²)	2000 (km²)	2020 (km²)	Change (1980-2020)	% Change (1980-2020)
1	>103	Humid	26,654	23,029	12,285	-14,368	-54%
2	80-103	Sub-humid	25,034	23,757	25,640	606	2%
3	65-80	Semi-humid	28,941	20,190	24,537	-4,404	-15%
4	48-65	Semi-humid to Semi-arid	78,493	53,342	46,968	-31,525	-40%
5	36-48	Semi-arid	49,894	52,885	65,509	15,615	31%
6	25-36	Sub-arid	70,832	56,230	101,497	30,665	43%
7	<25	Arid	293,966	344,378	297,376	3,410	1%

Figure 4: Shifting climate zones and expanding tropical and arid climate regions across Kenya- 1980–2020 (Ted et al., 2023)

1.5.3 Strengthening Natural Resource Governance and Legal Compliance

Kenya's dryland natural resources are governed through overlapping statutory and customary institutions, including county governments, national agencies (e.g., NEMA, WRA, KFS, KWS), community conservancies, WRUAs, and grazing committees. In practice, mandate ambiguities, weak enforcement capacity, and the absence of authoritative spatial baselines frequently undermine effective stewardship and accountability (Lockwood, Worboys, & Kothari, 2006). A comprehensive, geo referenced inventory addresses these gaps by operationalizing constitutional and statutory obligations—explicitly locating ecologically sensitive areas, clarifying tenure and access regimes, and identifying sites eligible for reservation and gazettement under existing law.

Asset mapping directly supports implementation of key legal instruments, including Articles 60, 62, and 69 of the Constitution of Kenya on sustainable land use and environmental protection (Republic of Kenya, 2010); Sections 8 and 15–16 of the Land Act on inventories and reservation of public land (Republic of Kenya, 2012); EMCA provisions on wetlands and protected environments (Republic of Kenya, 1999); the Wildlife Conservation and Management Act on corridors, conservancies, and endangered ecosystems (Republic of Kenya, 2013); the Water Act on protected catchments (Republic of Kenya, 2016); and PLUPA on County Spatial Planning and Special Planning Areas (Republic of Kenya, 2019). By linking assets to clear spatial extents, tenure classes, and legal pathways, mapping enables enforceable decisions, inter agency coordination, and measurable accountability for dryland governance (GoK, 2009; Lockwood et al., 2006).

1.5.4 Preventing and Managing Resource Based Conflicts

Arid and semi arid counties experience recurrent conflict cycles driven by water scarcity, pasture failures, livestock mobility, fencing, and the conversion of rangelands to cropland or settlements (FAO, 2019; Whyte, 2018). Climate extremes intensify these pressures by increasing temporal and spatial variability in access to water and forage (IPCC, 2019). Spatial inventories that explicitly map grazing reserves, livestock corridors, dry season water points, wildlife routes, and salt licks transform implicit and contested claims into visible planning inputs.

Such baselines support conflict sensitive land use planning by avoiding infrastructure placement across seasonal routes, enabling negotiated access and drought contingency grazing agreements, identifying hotspots where user overlaps are acute, and guiding human–wildlife coexistence zoning near riparian areas and dry season refugia. Evidence from Horn of Africa rangelands shows that formal recognition of mobility corridors and refuge areas reduces conflict incidence and losses, while improving rangeland condition and livestock productivity (FAO, 2019; GCA, 2021).

1.5.5 Unlocking Green Economy Opportunities, Natural Capital Accounting, and Climate Finance

Drylands underpin economies based on livestock production, wildlife tourism, biodiversity assets, renewable energy, and nature based solutions. Rangelands in developing countries support approximately 10% of global meat production and contribute an estimated 50–80% of agricultural GDP in many Sub Saharan African states (FAO, 2019). In Kenya, ASALs host about 70% of the national livestock herd, while ecosystems spanning Laikipia and Samburu sustain some of the highest wildlife densities outside protected areas (GCA, 2021).

Robust spatial mapping enables counties to integrate natural capital values into budgeting and NLIMS, design Payment for Ecosystem Services and wildlife lease schemes, and assemble bankable portfolios for climate finance—such as riparian restoration, wetland rehabilitation, rangeland regeneration, and soil and grassland carbon projects grounded in verifiable baselines and MRV frameworks (IPCC, 2019; Escobar, 2020). Where credible spatial baselines exist, counties are better positioned to articulate investment ready pipelines aligned with Vision 2030, the National Spatial Plan, and Agenda 2063 (GoK, 2015; African Union, 2015).

1.5.6 Protecting Community Rights, Cultural Landscapes, and Indigenous Knowledge

Pastoral and Indigenous communities possess rich and sophisticated Traditional Ecological Knowledge (TEK) related to seasonal grazing, drought refugia, salt lick nutrition, and wildlife coexistence. Yet many cultural sites, sacred groves, migration corridors, and communal water points remain undocumented and are therefore vulnerable to privatization or incompatible land uses (Berkes, 2012; King & Willow, 2011).

Participatory mapping documents TEK identified assets and embeds them within formal spatial plans, safeguards communal tenure and customary access under the Community Land Act (2016), aligns cultural heritage protection with biodiversity and water security outcomes, and elevates women's and youth knowledge—enhancing inclusivity and decision legitimacy (Chan et al., 2012; McPherson et al., 2020). By situating cultural landscapes within official land information systems, counties reduce dispossession risks while preserving place based governance systems that have historically sustained dryland resilience.

1.6 Purpose and Objectives

The overall purpose of the mapping initiative is to inventorize all land-based resources in Kenya's drylands and strengthen their governance. Specifically in Laikipia County, the project aimed to:

1. Take a stock of the county's dryland natural assets.
2. Identify the threats, challenges and opportunities for sustainable management, use, conservation and development of drylands natural capital.
3. Determine the efficacy of the various legal pathways for securing dryland natural assets and resources for posterity and climate resilience.
4. To develop context specific recommendations for the sustainable management, protection, and restoration of dryland natural assets that support long term ecological integrity and community resilience.

1.7 Scope and Limitations

The mapping scope for this initiative covered five assets (Table 3) including water related resources such as ponds, streams, rivers, swamps etc.; wildlife corridors, areas of dense vegetation and salt licks among others.

Table 3: Asset Mapping Scope

Natural Asset category	Elements/variables
Water Resources	Rivers/laggas, rock catchment, sand dam, springs and wetland (swamps and marshes)
Wildlife	Corridors and dispersal areas, Wildlife concentration areas/ breeding areas
Island of dense vegetation	Islands of dense vegetation
Livestock	Dry season grazing areas, Livestock Routes Threats/major issues
Natural Salt lick areas	Salt Licks areas

Spatially, the mapping exercise covered Laikipia County in Kenya which is listed as county number 31. This County covers about 9,532.2 km2 lying between latitudes 0° 18" South and 0° 51" North and between longitude 36° 11" and 37° 24' East. It borders Samburu County to the North, Isiolo County to the North East, Meru County to the East, Nyeri County to the South East, Nyandarua County to the South, Nakuru County to the South West and Baringo County to the West (Figure 3).

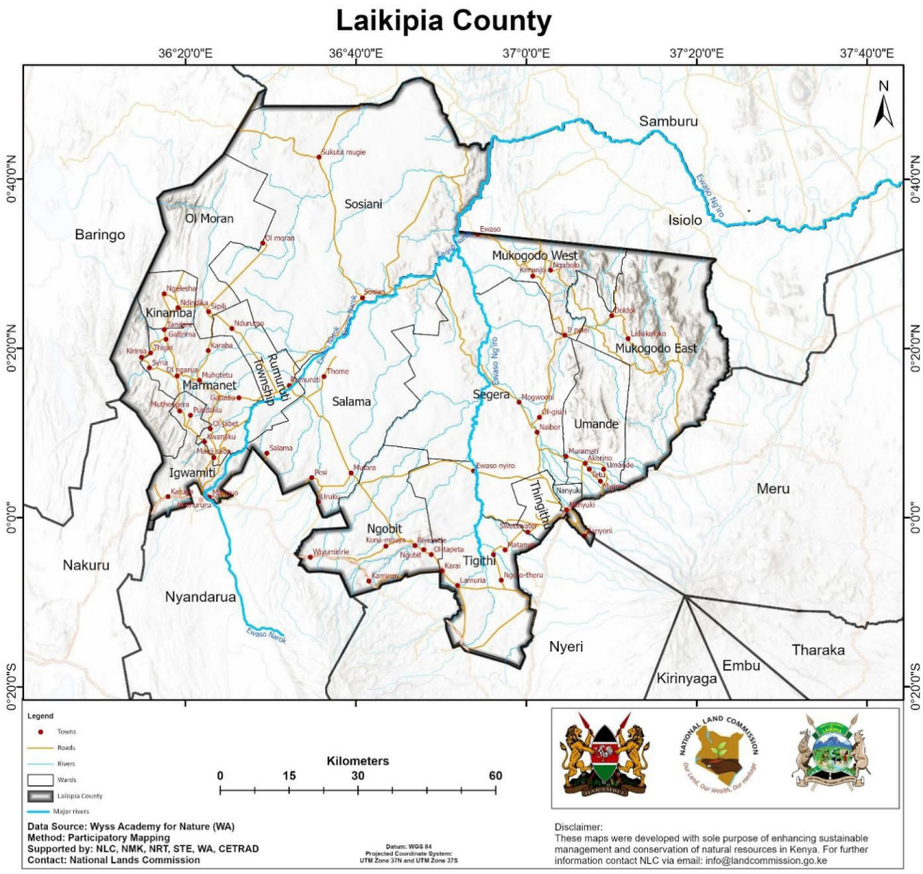


Figure 5: Laikipia County Map

Limitations

While the mapping exercise provides the most comprehensive baseline of dryland natural assets in Laikipia to date, several limitations were encountered:

1. **Geographical vastness and terrain challenges:** Some areas of Laikipia—particularly in Mukogodo, Rumuruti, Segera, and parts of Sosian—are rugged, remote, and difficult to access. This affected the ability to reach certain asset locations and may have resulted in underrepresentation of smaller or highly dispersed assets.

2. **Seasonal variability of natural assets:** Many dryland features such as seasonal rivers, springs, wetlands, and grazing areas fluctuate significantly across seasons. Mapping occurred during specific periods of the year, meaning some assets may present different characteristics during peak dry seasons or high rainfall episodes. This temporal limitation may affect interpretation of asset conditions.

3. **Inconsistent local naming and classification:** Different communities and stakeholders often use varied local names or classifications for the same natural assets. Although validation meetings helped harmonize terms, some inconsistencies may persist, especially where historical names differ from administrative or technical classifications.

4. **Limited historical datasets for comparison:** There are no previous county-wide inventories of this nature for Laikipia, making it difficult to compare trends or analyze long-term ecological changes. The report therefore serves as a baseline, but not a trend analysis.

5. **Resource and time constraints:** As with most large-scale field mapping exercises, constraints such as time, budget availability, field logistics, and human resources influenced the depth and coverage of data collected. Some areas may require follow-up surveys, especially for assets newly identified during validation workshops.

6. **Security and access restrictions in some localities:** Inter-community conflicts, especially in areas bordering Baringo and parts of Mukutan–Luoniek, restricted movement of field teams, limiting complete coverage of certain high-risk zones.

7. **Limitations inherent to participatory methods:** Participatory mapping is powerful for integrating Indigenous and local knowledge, but relies on memory, perception, and experience of participants. Some asset attributes may reflect community perceptions rather than measurable ecological conditions.

Despite the limitations outlined above, the data collected remains robust, credible, and sufficiently comprehensive to inform planning, policy development, and natural resource governance across Laikipia County. The constraints encountered do not invalidate the findings; rather, they highlight areas where periodic updates, complementary remote sensing, and continued community-based monitoring can further refine and enrich the inventory. This baseline therefore provides a reliable foundation for decision-making while paving the way for future enhancements that will strengthen the long-term accuracy and completeness of dryland natural asset mapping in the county.

1.8 Justification

1.8.1 Constitutional & Legal Underpinnings

The promulgation of Kenya's Constitution in 2010 brought a paradigm shift in the governance, including reform-oriented policies and laws for land and land-based resources management. Both land and natural resources are broadly defined under Article 260 of the Constitution; definitions that clearly depict mutual reinforcement rather than depicting land and natural resources as separate and distinct isolated ecotones. Notably, Chapter 5 of the Constitution demonstrates the close and intimate connectivity between land and environmental resources and hence the need to weave and manage these together as connected variables via a landscape connectivity lens.

Consequently, the National Land Commission (NLC) was birthed by the Constitution of Kenya 2010 and established under Article 67 of the Constitution to perform various functions, including the management and administration of public land on behalf of National and County Government and exercising oversight responsibility over land use planning in the country. Land is broadly defined in Article 260 of the Constitution to include all water bodies, marine waters and natural resources (such as forests, wildlife, minerals, fossil fuels, sunlight and genetic resources), most of which are further categorized as public lands under Article 62 of the Constitution. To effectuate the Constitution in the management of public land, **Section 15(3) of the Land Act 2012**, empowers the Commission with the responsibility of undertaking an **inventory of ALL land-based resources in the Country**. In addition, Section 8 of Land Act tasks the Commission with the following responsibilities:

a. **Identifying public land, prepare and keep a database of all public land,** which shall be geo-referenced and authenticated by the statutory body responsible for survey.

b. **Evaluating all parcels of public land based on land resources mapping and overall potential for use.**

c. **Sharing data with the public and relevant institutions** in order to discharge their respective functions and powers under this Act; and that the Commission may require the land to be used for specified purposes and subject to such conditions, covenants, encumbrances or reservations as are specified in the relevant order or other instrument.

Furthermore, Sections 11 (1, 2 &3) of Land Act 2012 regarding Conservation of ecologically sensitive public land, requires the Commission to:

a. **Take appropriate action to maintain public land** that has endangered or endemic species of flora and fauna, critical habitats or protected areas.

b. **Identify ecologically sensitive areas** that are within public lands and demarcate or take any other justified action on those areas and act to prevent environmental degradation and climate change.

c. **Consult existing institutions** dealing with conservation.

Apart from these legislative frameworks, other sectoral laws such as EMCA (199), Wildlife Conservation and Management Act (2013), Water Act 2016, Forest Conservation and Management Act 2016, among others provide vital frameworks for natural resources conservation, sustainable use and management in the Country.

The constitutional, policy and legal contexts provided herein, form the main beacons for the Commission to undertake dryland natural assets inventory and mapping for Laikipia County. This aims to cure an existing lacuna relating to lack of proper land-based natural resources inventory and databases especially in the Kenya's ASALs. This is also consistent with the National Spatial Plan (2015-2045) and the principles of National Land Policy, 2009 that are both geared towards ensuring that land in Kenya is held, used and managed in a manner that is optimal, equitable, efficient, productive and sustainable.

1.8.2 Practical Context

Dryland ecosystems including wetlands (springs and oases, lakes, rivers) and critical habitats such as forests and wildlife parks constitute important natural assets that spur socio-economic development in drylands (Arid and Semi-Arid Land- ASALs). They are not only food, water, and medicine that are consumed by local communities, but equally, play a significant role in supporting livestock production and thus improving human well-being in these dynamic and fragile landscapes. Importantly, drylands are known for playing host to huge biodiversity resources such as wildlife that also contribute immensely to ecological and socio-economic development through tourism and other ventures. Yet these areas continue to face ecological 'marginalization' and neglected from mainstream ecosystems. In fact, very few tourists visit these areas because of historical marginalization, insecurity and poor infrastructure.

The perception and mindset that drylands in Northern Kenya are unproductive often stems from a narrow focus on traditional agriculture, particularly crop farming, that relies on consistent rainfall. However, dryland ecosystems are endowed with natural capital that is unique but are not given much recognition and attention. Thus, recognizing and sustainably utilizing the diverse range of natural resources present is crucial in attaining the socio-economic vision and agenda of the Country.

The natural capital ranges from livestock adapted to arid conditions to renewable energy (wind and solar energy) potential and unique biodiversity. In addition, the diverse land formation and water resources (swamps, springs, rivers) supports flora and fauna as well as livelihood of the communities. The region can indeed unlock significant economic and social development.

The true worth and full potential of dryland natural assets have not been explored and documented to provide tangible evidence for policy, sustainable management and decision-making. Their existence is therefore highly threatened, given that the economy of Kenya has shifted to the North, following discoveries of important assets such as Petroleum,

Minerals, wind Power and large scale infrastructural projects including the LAPSSET Corridor, Horn of Africa Gateway Development Project (HoAGDP) etc. Further, the survival of these critical ecosystems and natural assets is more threatened by the on-going Community Land Registration, within the ambit of Community Land Act 2016, which is led by the State Department for Lands and Physical Planning (SDLPP). If these resources are not properly captured and documented, reserved in the National and County/community land Cadastres/ registers, and attendant County Spatial Plans (CSPs), as well as gazzetted, they will be wiped away and important ecosystem goods and services will be lost.

This report therefore makes a significant contribution in improving the understanding and appreciation of dryland natural assets, for policy alignments and related potential reforms that will favour improved and sustainable natural assets conservation and governance. Similarly the report provides evidence for situating dryland assets as the heartbeat for livelihoods and community resilience in these fragile landscapes.

1.8.3 Significance

Mapping of drylands ecosystem and natural assets is critical in ensuring appropriate inventories of natural resources in the country, created to support decisions and actions relating to their management and to streamline their governance. Managing what is known is imperative to the commission as an oversight body on land and natural resources. In addition, natural resources management is a concurrent jurisdiction between National and County Governments in line with Schedule 4 of the Constitution relating to distribution of functions and separation of powers.

The inventory will be translated into Atlas of drylands natural assets which provides a synthesized data and information hub on drylands natural capital in a visually orienting format that is easily understandable by the government, private sector, development partners, civil society, researchers and the general public. The atlas will further provide the what, whose, the where and how the entire natural capital is distributed and their contribution to socio-economic development in the country as well as any changing patterns and socio-economic linkages; the need and the mechanics for their protection and sustainable use.

At the strategic policy level, mapping these assets and resources is meant to facilitate and make them public through reservations in the land cadastres and gazette notices for their enhanced and continued protection, conservation, access and use by various local communities among other stakeholders. Thus, this mapping initiative is significant given that it provides:

a. Reliable information and data for decision and policy makers on the status, trends and contribution and sector linkages of the resources and socio-economic development
b. Baseline information for research and education framework for advancing in- depth research and progress tracking of the various elements of the country's dry land-based resources within the academia and education portfolios.
c. Salient information for civic and advocacy programmes for the various population segments and stakeholders at different levels especially the local communities, who are the primary stakeholders and custodians of the assets, that are directly or indirectly affected by decisions regarding natural resources. It visually paints the picture of the state of the natural resources, the threats and opportunities through intersection analysis, for advancing the sustainable development agenda.
d. As a policy tool and oversight framework, it will inform evidence based transformative policy development and set the pace for important advisories to relevant authorities, Ministries, Departments, Agencies and Counties (MDACs) regarding sustainable management and development of the natural resources including county spatial planning (CSP). In addition, the atlas and inventory data/report provides succinct policy recommendations for various actors. And lastly,
e. Land and land use data to the National Land Information Management System (NLIMS). Such data will be valuable to inform preparation of physical and land use plans, land use policies, standards and guidelines as well as control and regulation of land and property use in respect of all categories of land.

1.9 Alignment with Government Policies, Priorities and Strategies

The inventory and mapping of critical natural assets in the dryland areas of the Republic of Kenya is in harmony with the County Integrated Development Plans (CIDPs), Kenya Vision 2030, sectoral strategies and policies. Both the National Land Policy (2009) and National Land Use Policy (2017), emphasize the importance of mapping natural resources. Specifically, they highlight the need to identify and map trans-boundary natural resources, unified mechanisms for natural resource information and enhancing preparation of strategic spatial development plans. These initiatives aim to improve the management and conservation of natural resources in Kenya by ensuring their sustainable use and protection.

Therefore, the intervention of mapping of natural capital is in line with the Fourth Medium Term Plan (MTP IV) of vision 2030. Kenya prioritizes the management and development of natural resource in the fourth priority sector. The Key focus areas include: Water Harvesting and Conservation, Environmental Protection, Sustainable Waste Management, Infrastructure Development and Natural Resource Management. Thus, the plan acknowledges the importance of natural resources in Kenya's economy and provides anchorage for the sustainable use and management of these resources. The plan is also aligned to international commitments such as the UN Agenda 2030 and Africa Agenda 2063, which emphasize on sustainable development and environmental protection. Further, the mapping and inventory initiative demonstrate the government's commitment to sustainable development and the responsible management of natural resources in Kenya.

Equally, the Laikipia County Integrated Development Plan (CIDP) 2023-2027 places high priority on mapping natural capital. This involves collaboration among sectors such as Infrastructure, Lands, Public Works, and Urban Development, as well as Water, Environment, and Natural Resources. The Land sector emphasizes the need for enhanced land use planning and management through County Spatial Plans and land information systems, as detailed on page 104. Meanwhile, the Water, Environment, and Natural Resources sector highlights the significance of water services, environmental conservation, natural resources, and climate change mitigation, as discussed on pages 135. In this regard, this mapping and inventory initiative aligns with the Laikipia CIDP.

1.10 Target Users

The report targets the following users:

1. General public
2. National Land Commission
3. Government Ministries, Departments and Agencies
4. County Governments
5. Researchers and Academic institutions
6. Non-Governmental, Community based Organizations and Civil Societies
7. Media

2. APPROACHES & METHODOLOGY

2.1 Overview

This report is a product of extensive data gathering and rigorous community consultations and participation in mapping dryland natural assets within Laikipia County. This section details the approaches and the methodological processes adopted to deliver this mapping initiative.

2.2 Approaches

The mapping of the county assets adopted the following approaches:

1. **Collaboration**- The initiative is a product of intensive collaboration and partnership between the various state agencies at national, subnational and local level; primarily consisting of NLC, county government of Isiolo, NMK, KWS, KFS, CETRAD, Save the Elephants, NRT, WYSS Academy for Nature and the Ministry of Interior (County Commissioner and Chiefs) and local communities.
2. **Community Centred Participatory GIS Mapping**–The mapping initiative involved local community members in identifying, mapping and profiling of all their assets. By consulting the community, a wealth of information on known and previously unknown assets were gathered, including personal experiences, knowledge and values attached to them.
3. **Technology Integration–**The mapping initiative adopted the use of ESRI's ArcGIS Survey123 application to capture data regarding the identified assets.
4. **Gendered Participation** - The mapping process ensured gender, cultural, social sensitivities and inclusion to enhance diversity in the perspectives of various players.
5. **Capacity Strengthening and Creation of Green Jobs**- The exercise created a number of green jobs through recruitment, training and involvement of youths (GenZs) in mapping of assets. The youths were trained and participated in this project and are now equipped with the skills and knowledge to conduct similar assignment when need arises.
6. **Adaptability**- The mapping team for this initiative did not remain static in their thinking and methodology but rather adjusted it to fit the prevailing circumstances, based on new information and unexpected challenges in different communities and landscapes. This was imperative for effective management of uncertainties and maintenance of validity and integrity of the work processes and outputs.

7. The Storytelling Approach (STA)

Storytelling is increasingly recognized as a powerful participatory method in mapping by allowing communities to share place-based knowledge that might otherwise be invisible in traditional GIS or ecological surveys. The approach uses the power of narrative to reveal and highlight the hidden assets of a community, particularly those relating to natural resources and environmental features.

Why STA in Natural Asset Mapping?

- **Participatory Knowledge Creation:** STA is a tool for surfacing "multiple truths" in mapping—especially those rooted in cultural memory or marginalized voices.
- **Natural Assets Beyond Ecology:** Conventional natural asset mapping often relies on scientific assessments of biophysical features (e.g., wetlands, forests). However, narrative-based approaches recognize that natural assets carry emotional, historical, and cultural significance (Chan et al., 2012).
- **Indigenous and Local Knowledge Systems:** In many pastoral communities, stories are the primary mode of ecological knowledge transmission. Storytelling captures Traditional Ecological Knowledge (TEK), enabling planners to better understand land stewardship practices and sacred ecological relationships (Berkes, 2012).
- **Story Mapping Tools and Case Studies:** Digital platforms like ArcGIS StoryMaps and analog techniques like community sketch mapping are increasingly used to document spatial stories. Case studies show how narrative mapping improves environmental justice, conservation planning, and urban greenspace design (Cunsolo & Ellis, 2018).

In this mapping initiative, STA was adopted to tease out the respondents knowledge, understanding and perception on assets that may be hidden. Two (2) main Techniques were adopted during the mapping exercise including:

1. **Story Circles:** Through small group sessions, participants were able to share memories or experiences with natural resources (Plate 1). This method encouraged deep listening, mutual respect, and emotional connection — surfacing place-based knowledge that technical tools such as Arch GIS often miss. Other benefits included: building community cohesion, amplifying marginalized voices, producing emotionally rich spatial data and enhancing trust in planning processes.

Plate 1: Use of Story Circles in the Asset Mapping

2. **Participatory Mapping:** where community members were invited to interact with printed or digital topographic (topo) maps to identify their natural assets. As stories were shared, pin locations and annotate them with quotes, photos, or drawings (Plate 2). This method was a practical and powerful way to blend scientific geography with local knowledge. It allowed participants to locate, annotate, and interpret real-world terrain while layering on personal, cultural, and natural assets insights. Other benefits included: making complex terrain understandable and relatable, encouraging people to connect place with memory and identity and lastly supporting evidence-based but locally rooted decision-making.

Plate 2: Use of Topo Maps as Storytelling Technique in the Asset Mapping

Overally, the STA enriched the mapped data with meaning, memory, and identity—producing more inclusive, resilient, and place-sensitive planning outcomes. It aligns with calls for decolonizing planning, advancing social-ecological integration, and valuing non-expert knowledge in natural resources governance.

2.3 Methodological Process

The mapping of dryland assets within Laikipia County commenced in March 2022 and progressed in phases until 2025 through an iterative process as detailed hereunder:

2.3.1 Inception Phase

Step 1: Consultations

This phase mainly involved community penetration through courtesy calls and engagements with the County Commissioner and local administration (the chiefs and assistant chiefs at location level). The facilitation through formal communication from the County Commissioner and local administration provided a clear road map and impetus for the exercise and formed the basis for the next phase.

Step 2: Preliminary Assets Identification:

The second step involved the production of a community asset map of the important resources for their livelihood system. This map was prepared in a community setting to enable the participation and validation from a large group of people. With the aid of google aerial imagery, several maps were produced by smaller sub-groups (women, youth, and elders) and then amalgamated (Plate 3). The final map was then used to develop a preliminary checklist of all ecological assets available in the areas where they operate. It is important to note that the use of Google Earth was only for orientation to enable participants navigate the imagery and cross-reference their key resources against the satellite imagery.

Plate 3: Preliminary Community Assets Tracing and Identification from google aerial imagery

Step 3: Developing the Survey123 Data Collection Digital Forms

Using the preliminary assets identification checklist and information from secondary sources, a data collection platform was developed online through the Arch GIS 123 connect. Multiple forms were created for the various requirements depending on the asset category. For a given inspection form, fields were specified for completion in form of radio buttons, drop-down selections, checkboxes, or text entry fields. Some of the information that were captured included among others: details of the interviewer, location/place name, assets location, management and governance, main users, land tenure, threats and opportunities. The information that was to be collected was thereafter loaded in an Android tablet and smart phones. Figure 6 illustrates the Survey123 interface showing the data collection digital form.

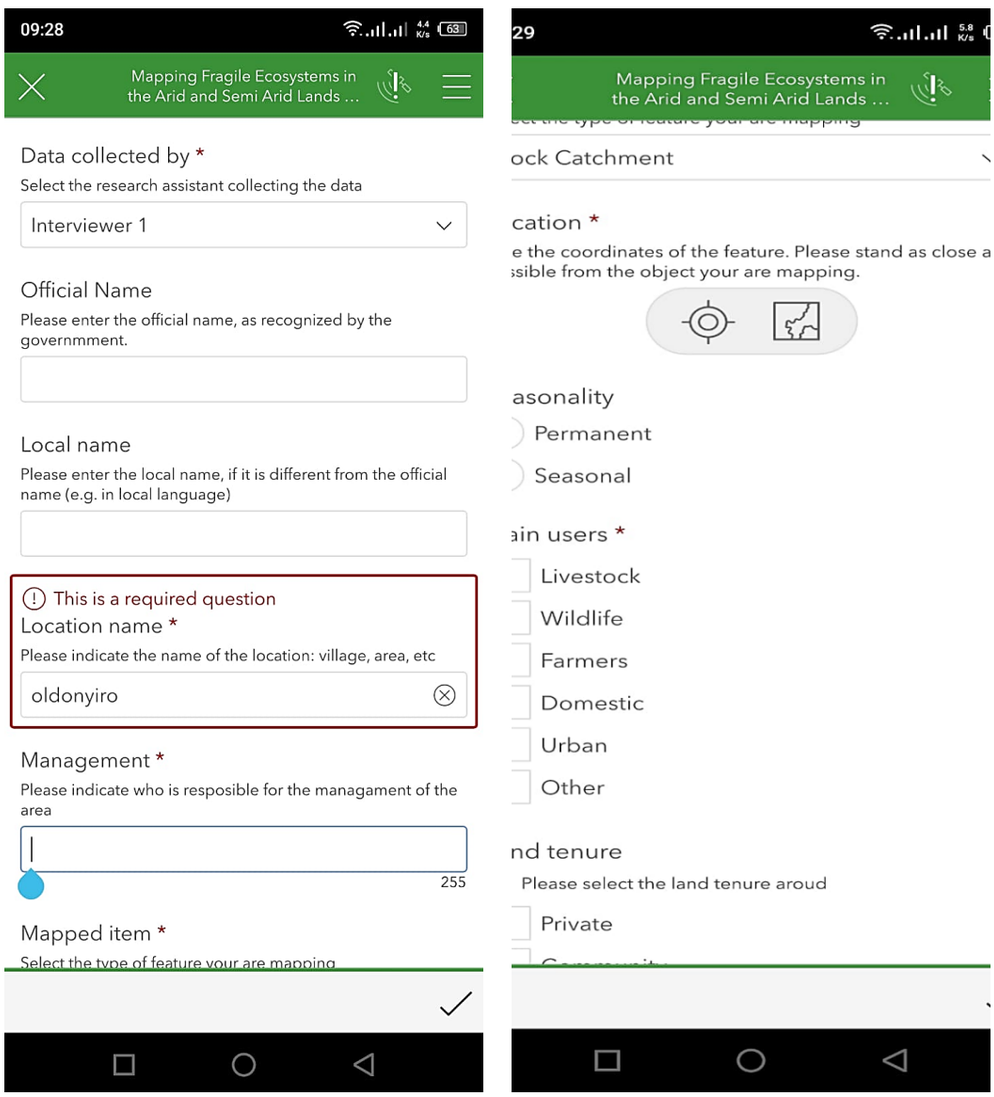


Figure 6: Survey123 interface showing the data collection digital form.

Step 4: Recruitment and Training of Data Collection Assistants:

A team of 15 research / data collection assistants were identified, recruited and taken through a 3-day training on the use of ESRI's ArcGIS Survey123 application before they were sent to the field (Plate 4). The Data collection assistants who were recruited had atleast past experience in similar exercise and were all graduates in various fields including statistics, rangeland development, Ecology and environmental studies, rural development, GIS and ICT.

Plate 4: Training of Data Collection Assistants

2.3.2 Phase 2: Data Collection

Step 5: Sampling:

The sampling procedure adopted was both stratified and purposive. The stratification was executed at the wards, locations, sub locations, up to the village level. On the other hand, purposive sampling was based on the community's intrinsic knowledge and understanding about the available assets in their localities **where they deliberately took the mapping team to pick points and capture data**. Further, additional data was also collected through observations to provide a better understanding on the nature and state of these assets including any threats. The data collection team equally compiled field notes describing what was observed based on an observation matrix. Photography was deployed to capture the key phenomenon of interest.

Step 6: Field Survey

Using the preliminary assets identification checklist and printed satellite imagery, the team proceeded to the field. The data collection team included a mix of the local communities (mainly the data collection team), opinion shapers, key resource persons and technical team alongside government administration officials at the local level. The blend in team composition ensured social security and eliminated anxiety about the field mission.

With the data collection tablets and smart phones already installed with ArcGIS Survey 123 application, the field assistants proceeded to the field to pick the assets and the attendant points (Plate 5). Additionally, the attributes as per the data collection digital form included GPS coordinates and a minimum of three geo-tagged photos per asset. This information was then saved in the digital device's outbox.

Plate 5: Data Collection Team during the Field Survey

2.3.3 Phase 3: Data Mining & Analysis

Step 7: Verification of Facts and Data from the Field:

For purposes of quality control, the team held an end of each day debriefing session for data verification and cleaning as well as address any potential challenges encountered during the day. The data was then transmitted to the WYSS academy's cloud based Arch GIS online server.

Step 8: Data Analysis and Interpretation

Natural assets were categorized into distinct thematic areas (Table 2), based on resource types and aligned with environmental and land management classifications commonly used in ecosystem and resource planning. This thematic grouping also enabled the enumeration of all natural assets within the county. To assess the availability of these assets, we used the frequency of occurrence of each resource type across sub-counties and wards, rather than measuring their physical size. Where applicable, GPS coordinates were collected and mapped to visualize the spatial distribution of the assets according to thematic categories. A thematic analysis was undertaken to determine the frequency and percentage distribution of assets, highlighting sub-counties and wards with relative abundance or scarcity of specific resources.

In addition, the number of data collectors and validation workshop participants was analyzed to assess the integration of indigenous knowledge and gender inclusivity, thereby ensuring a participatory and inclusive approach. This methodology enabled the incorporation of traditional ecological knowledge into the asset mapping process, enriching both the accuracy and community relevance of the findings. The team also conducted a comprehensive review of relevant policies, the Constitution of Kenya, and other legal frameworks to identify the key laws and provisions that secure and protect specific natural assets.

Finally, a detailed assessment of the management status of natural resources was conducted, with particular attention to water catchment areas, seasonal variability, and salinity levels. The study further examined land ownership and tenure systems, identifying critical challenges and potential threats that may undermine sustainable natural resource management.

Step 9: Continuous Brainstorming and Norming

Throughout the entire process, the team actively engaged in continuous brainstorming and norming sessions, which were integral to the success of the initiative. Brainstorming provided an open platform for team members to freely share ideas, propose solutions, and explore innovative approaches to address emerging challenges. These sessions encouraged creativity, inclusivity, and collective problem-solving, ensuring that diverse perspectives were considered in decision-making.

Norming, on the other hand, helped the team to establish and reinforce shared values, norms, and working principles that guided their interactions. Through this process, team members built trust, fostered mutual respect, and aligned their individual efforts towards common objectives. The norming sessions also played a critical role in clarifying roles, expectations, and standards of performance, which minimized potential conflicts and enhanced overall collaboration.

By continuously revisiting and refining their ideas and working relationships, the team was able to maintain a strong sense of cohesion and purpose. This iterative engagement ensured that all members remained focused on the shared vision and that their collective efforts were well-coordinated towards achieving the desired outputs. Ultimately, this process of continuous brainstorming and norming contributed significantly to the clarity of purpose, unity of direction, and overall effectiveness of the team (Plate 6).

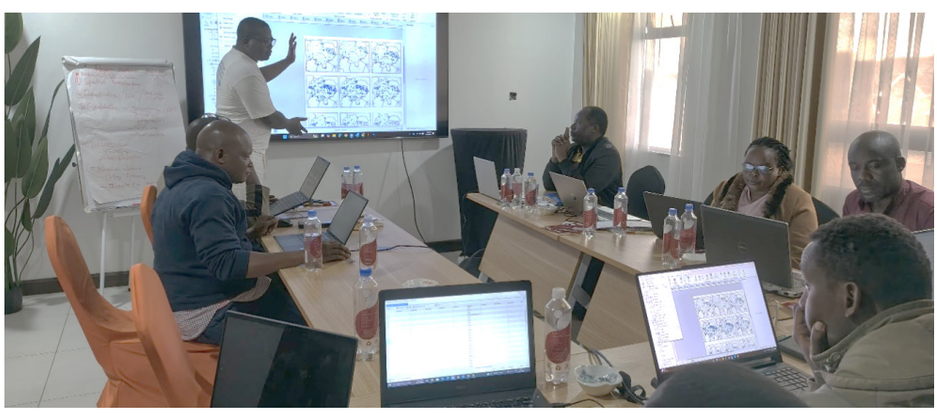


Plate 6: Brainstorming and Norming Session

2.3.4 Phase 4: Public Participation and Validation of the Report

Article 10 of the Constitution, 2010 has already provided public participation as a fundamental principle in governance. Further Article 232 (1) (d) emphasises peoples involvement in policy making processes as a fundamental principle and value in public service. Supreme Court of Kenya judgement regarding Petition 5 of 2017) [2019] KESC 15 (KLR) provided clear public participation standards and guidelines under paragraph 95. Further on this judgement emphasised on Justice Odunga's judgement (par.75) in *Robert N. Gakuru & others v Governor Kiambu County & 3 others*[2014] eKLR, that the public participation ought to be real and not illusory and ought not to be treated as a mere formality for the purposes of fullment of the Constitutional dictates.

Equally, validation forms a critical step in ensuring legitimacy, ownership and obedience to the rule of law; in particular, the democratic principle-governing people's participation in governance processes. In addition, the step provides the opportunity to improve the capacity and awareness of the various stakeholders and interested parties to critique and ventilate on the outcome of the mapping process. In this regard, structured engagements and validation sessions were convened with different stakeholders and interested parties. Additionally, validations provide spaces for corroboration, addition or deletions, as the case may be.

For the dryland asset mapping, a rigorous public participation and consultation with various stakeholders was conducted not just to comply with the legal requirements but to promote ownership and social legitimacy of the entire project. Consequently, a total of 46 participants (38 male and 8 women) were consulted and participated in the two rounds of public participation exercises that were convened by the Commission at Aberdare Cottages in Nanyuki. Participants for the public participation exercises were drawn from land owners since much of the county land are already adjudicated and fall under private tenure, public agencies such as NEMA, NLC, WRA, KFS, KWS and county government of Laikipia (Table 4 and Plate 7 - 8). The stakeholder inputs are consolidated in Appendix 1.

Table 4: Participants Engaged During the Validation Sessions

Sessions	Stakeholders Category	Engagement Date	No. of Attendants by Gender		TOTAL
1	National Government/ Policy makers	Friday 8th November 2024	MEN	WOMEN	
			21	8	29
2	County Government of Laikipia	Wednesday, 26th February 2025	19	3	22
	Laikipia Land Owners	Tuesday, 1st April 2025	19	5	24
	TOTAL				**75**

Plate 7: Ms. Peters (CETRAD) making a presentation during a validation session with the National Government/Policy makers

Plate 8: Dr. Dickens (WYSS Academy for Nature) making his remarks during a validation session with Laikipia Landowners

2.3.5 Ground Truthing and Filling of Data Gaps

Following the stakeholder validation workshop, several data gaps and discrepancies were identified in the preliminary natural asset inventory. These included missing asset locations, inconsistencies in classification, unclear management status, and areas with incomplete spatial coverage. To address these issues, a targeted ground truthing exercise was conducted in June 2025 (Plate 9). Field teams revisited selected sites to verify the existence, condition, and classification of assets flagged during the workshop. The process involved direct observation, GPS point verification, and follow-up consultations with local stakeholders, including community elders, resource users, and county officials.

Plate 9: Ground Truthing Exercise at Luoniek Water Catchment Area (LR No. 1092) in Luoniek Location

This step not only helped to correct and update the data but also incorporated additional insights provided by participants during the validation process—such as seasonal availability, cultural significance, and emerging threats to specific assets. Where new or previously undocumented assets were reported, they were mapped and integrated into the final database. Equally, the ground truthing exercise ensured that the revised dataset was accurate, inclusive, and reflective of both technical assessments and local knowledge, thereby strengthening the reliability of the natural asset mapping and planning outputs. A schematic diagram of the methodology adopted is as illustrated in Figure 7.

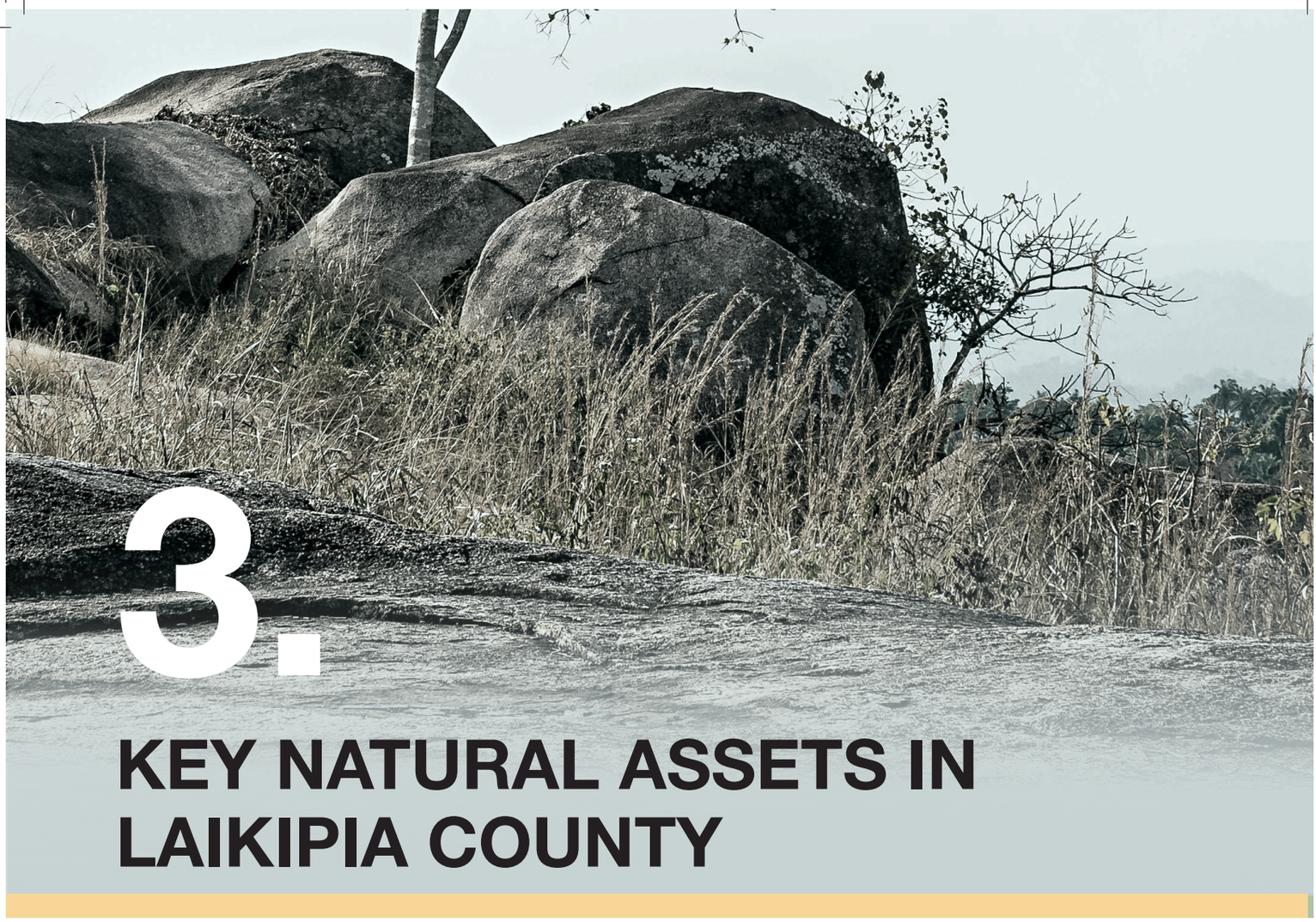
Figure 7: Methodology Adopted in the Assets Mapping Process

2.4 Summary of Challenges Encountered and Mitigation Measures

While this community participatory asset mapping was a powerful approach to identify local resources, skills, and capacities, it did not without challenges. Table 5 summarised the Challenges Encountered and Mitigation Measures applied during the exercise.

Table 5: Summary of Challenges Encountered and Mitigation Measures

Challenge	Mitigation strategy
Higher expectation from the community around short term benefits when organizations involved are mentioned	Clarifications made on roles and responsibilities alongside the anticipated benefits for the various parties involved in the exercise. This helped to cure the challenge relating to wild expectations from the various stakeholder groups
Vastness, ruggedness and remoteness of the landscapes	This was cured through procuring 4WD vehicles at a capable of managing and enduring such terrain and distances. In addition, the use of motorbikes by data assistants to penetrate and reach some of the hard to reach remote areas helped in enhancing maneuverability and access. Utilization of local communities who understand the terrain and are able to avoid where necessary and navigate such terrains
Inadequate resources- Manifested in both adequacy and timeliness. This caused delay in execution of project implementation	Heightened resource mobilization through fundraising including development of bankable project proposals alongside partnerships and collaborations. In addition, increased networking and pitching of concept idea notes and
Differing interpretations and terminologies of various asset locations and names.	This was reconciled through joint validation meetings and oral histories.



3.

KEY NATURAL ASSETS IN LAIKIPIA COUNTY

3.1 Overview

Natural assets are the myriad forms of wealth created by nature, which forms an integral part of society. These assets act as foundations for communities' identity, economic standing and creation of wealth. This section provides an inventory of the existing natural assets mapped in Laikipia County.

3.2 Water Resources

Laikipia County is endowed with various water resources that are spatially distributed over the landscape. The water resources mapped were: 309 ponds, 71 rock catchments, 96 sand dams, 590 springs and 220 wetlands (marshes/swamps) (Table 6). The County's main river is the Ewaso Nyiro which originates from the western slopes of Mount Kenya and the Aberdare ranges (Figure 8).

Table 6: Water Resource per Wards in Laikipia County

Ward	Ponds	Rock Catchment	Sand dams	Spring	Wetlands
Githiga	8			28	12
Igwamiti	22			96	51
Marmanet	17			75	48
Mukogodo East	48	14	44	110	8
Mukogodo West	44	35	38	26	1
Nanyuki	2			6	0
Ngobit	22			26	12
Ol Moran	18		1	17	12
Rumuruti Township	12			18	11
Salama	17		2	30	11
Segera	21	9	8	21	10
Sosian	41	2	3	118	41
Thingithu	7				0
Tigithi	14			5	2
Umande	16	11		14	1
Grand Total	**309**	**71**	**96**	**590**	**220**

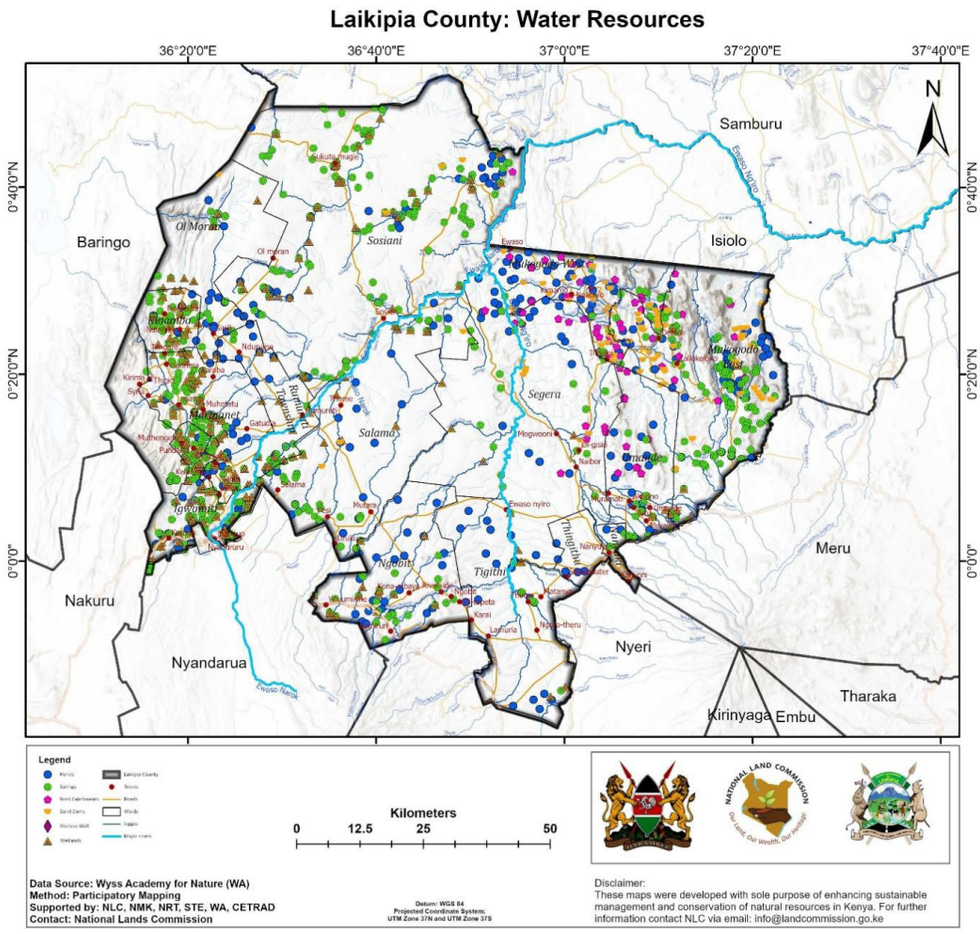


Figure 8: Spatial distribution of Water Resources in Laikipia County

3.3 Rivers and tributaries (Laggas)

3.3.1 Numbers and Spatial Distribution

Laikipia County is traversed by several important rivers that are vital for its ecosystems, wildlife, and communities. The main river of Laikipia is Ewaso Ng'iro River (Plate 10) that flows eastwards across Laikipia, collecting water from several tributaries before continuing into the arid and semi-arid lands of Isiolo, Samburu, and beyond. The key tributaries and associated rivers in Laikipia include: Nanyuki River, Burguret River, Timau River, Naromoru River, Likii River and Ngobit River. These riverine ecosystems support a myriad of socio-economic activities of forest users, pastoralists and farmers and maintain a great number of wildlife (Figure 9).

Plate 10: Ewaso Nyiro River

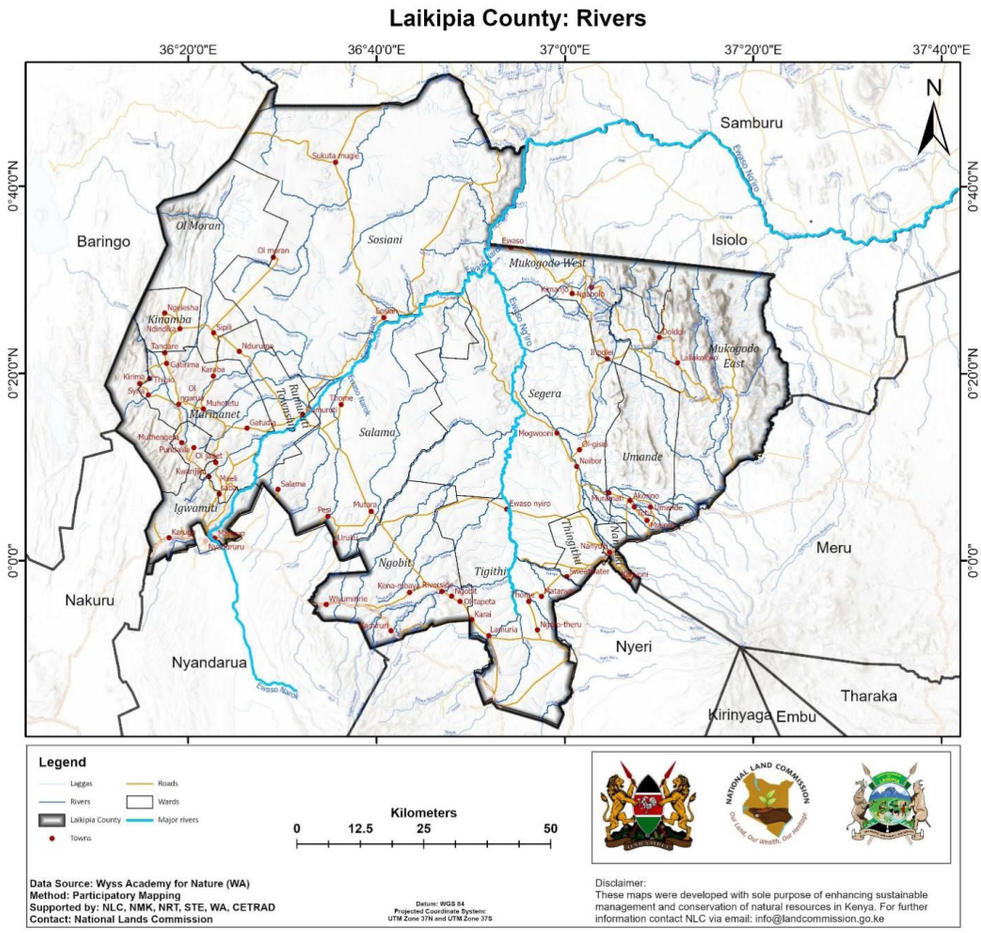


Figure 9: Rivers and Tributaries (Laggas) in Laikipia County

3.3.2 Uses

Laikipia County is a semi-arid region, and rivers are particularly important for managing water resources, especially during dry periods. The existing rivers and their tributaries sustain a number of uses and users. Livestock, pastoralists, wildlife and domestic use are among the highest consumers of water from the existing river. Rivers are a primary source of drinking water for many communities in Laikipia. Equally, water from rivers is also used for irrigating crops, helping farmers produce food and fodder for their livestock. Riverine ecosystems support a variety of economic activities, including fishing, tourism, and traditional practices of forest users, pastoralists, and farmers (Fig. 10). Lastly, Rivers play a crucial role in maintaining the health and biodiversity of various ecosystems, including forests, wetlands, and grasslands. The people of Laikipia use rivers in this county for domestic, wildlife, pastoralism and livestock production and significantly, crop farming along the rivers.

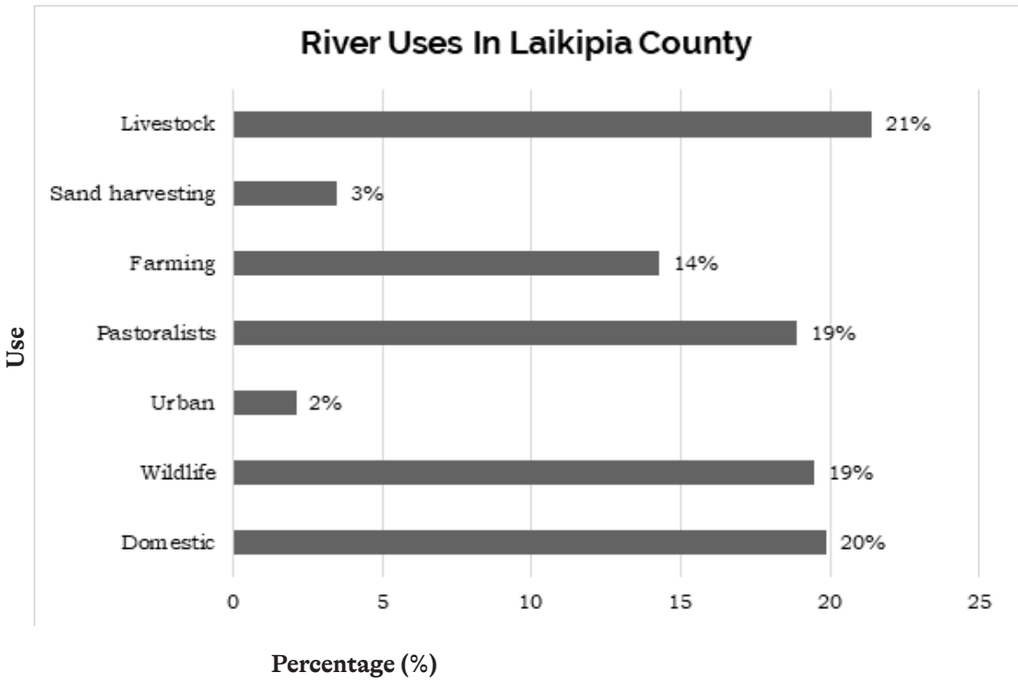


Figure 10: River Uses in Laikipia County

3.3.3 Management

All water resources belong to the people of Kenya collectively as a nation. These resources are national goods/assets that are under the direct control/ custody of the National Government, represented by Water Resources Authority (WRA) under the Ministry of Water who in turn engage local communities to form of Water Resource Users Associations (WRUAs). It is estimated that about 25 WRUAs operate in the Laikipia County with the responsibility to manage water allocation and use.

3.3.4 Threats and Challenges

- **Water Scarcity and Climate Change:** Laikipia County is experiencing increased water scarcity due to unpredictable rainfall patterns, low rainfall, and dried-up or near-drying-up surface water sources. Climate change exacerbates these challenges, leading to longer dry periods and more intense rainfall events. Data shows that there are diminishing water returns (Fig), occasioned by climate changes
- **Water Resource Conflicts:** The competition for limited water resources leads to conflicts between different user groups, including farmers in the upper river zones, pastoralists in the lower sections, and wildlife reliant on river water. A number of water and pasture-related conflicts are evident in Laikipia.
- **Increased Flood Risk:** While Laikipia experiences periods of drought, it also faces increased risks of flooding due to extreme precipitation events. These floods disrupt infrastructure, cause damage to property, and impact livelihoods of local communities.
- **Impact on Livelihoods:** The challenges related to Laikipia's rivers have a direct impact on the livelihoods of the county's residents, who depend on these water sources for agriculture, livestock, and other essential activities.
- **Riparian reserve encroachment:** River encroachment, particularly by large-scale farmers, is a significant problem in Laikipia County, impacting water availability and leading to conflicts. The issue extends beyond irrigation diversions, with encroachment on riparian reserves also contributing to environmental degradation. Large-scale farmers have been accused of diverting water from rivers for irrigation, leading to

reduced flows and water scarcity for downstream communities. Equally, water scarcity due to river encroachment has led to conflicts between communities and between farmers and herders.

- **Weak governance of water resources** - Generally, water resources are regarded as common pool resources, God-given and therefore belong to no one. This attitude renders water resources into a quagmire that is characterized by inadequate tenure security and proper resource governance.

3.3.5 Opportunities

- **Equity in water sharing** and to maintain its quality and the integrity of riparian and catchment areas.
- **Need for Integrated Solutions:** Addressing these challenges requires an integrated approach that includes climate-smart agriculture, water resource management strategies, and community engagement to ensure sustainable water access and use for all.
- **Tourism:** The rivers and associated wildlife are a major draw for tourists, supporting tourism-related businesses and employment.
- **Agriculture:** Water from the rivers supports irrigation for crops, livestock grazing, and aquaculture, contributing to food security and economic diversification.
- **Ranching:** Ranchers rely heavily on river water for livestock, a significant economic activity in Laikipia.
- **Water Services:** The county government and water authorities to improve water access and sanitation, providing essential services and creating economic opportunities in the water sector.
- **Improved Water Access:** water projects have demonstrated the positive impact of improved water access on household incomes, nutrition, and hygiene, particularly for rural communities.
- **Economic development and empowerment:** in productive farming activities, contributing to their economic empowerment and local development.

3.4 Ponds

3.4.1 Numbers and Spatial Distribution

Water ponds are small, shallow bodies of standing freshwater (Plate 10) that can be either natural or man-made. They form a vital part of dryland ecosystems, providing critical water sources that support a wide variety of plants, animals, and livestock, especially during dry seasons. These ponds contribute significantly to biodiversity, serving as habitats for aquatic and semi-aquatic species, and act as important watering points for wildlife and pastoral communities.

The mapping exercise identified a total of 309 water ponds across Laikipia County, with an uneven distribution across the 15 wards. This variation reflects differences in ecological conditions, water management practices, and local community investments in water harvesting and storage infrastructure (Table 7 and Figure 11).

1. *Lorkumei pond, Ethi location, Laikipia county*
2. *Pond in Loisaba Conservancy, Oloiborsot location*
3. *Gwa Kamenya Pond, Ethi south location, Laikipia county*

Table 7: Ponds in Laikipia County

Ward	Ponds
Githiga	8
Igwamiti	22
Marmanet	17
Mukogodo East	48
Mukogodo West	44
Nanyuki	2
Ngobit	22
Ol Moran	18
Rumuruti Township	12
Salama	17
Segera	21
Sosian	41
Thingithu	7
Tigithi	14
Umande	16

Plate 11: A pond in Laikipia County

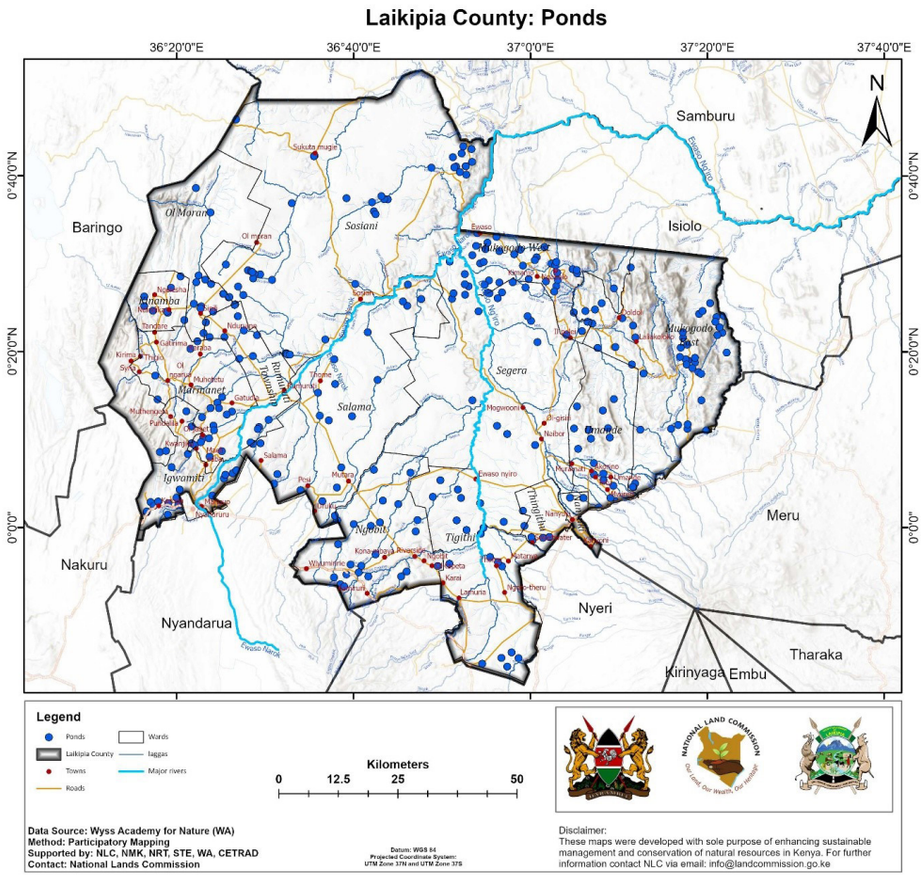


Figure 11: Spatial Distribution of Ponds in Laikipia County

3.4.2 Uses

The existing water ponds within Laikipia County support a wide range of uses that are critical to the region's livelihoods, ecosystems, and overall resilience. These ponds serve as essential water sources for **livestock watering, domestic consumption, wildlife conservation, pastoralism, and small-scale farming,** particularly during dry periods when other water sources are scarce (Fig. 12). Their presence reduces the distances communities and animals must travel to access water, thereby minimizing stress on both human and ecological systems.

In addition to these primary uses, some ponds also cater to **urban water needs**, providing supplementary water for nearby towns and settlements. Furthermore, certain ponds are linked to **sand harvesting activities**, contributing to local construction material supply chains and providing livelihood opportunities. This multifunctionality highlights the importance of water ponds as critical infrastructure within Laikipia's dryland landscapes — supporting not only water security but also socio-economic development and environmental stability.

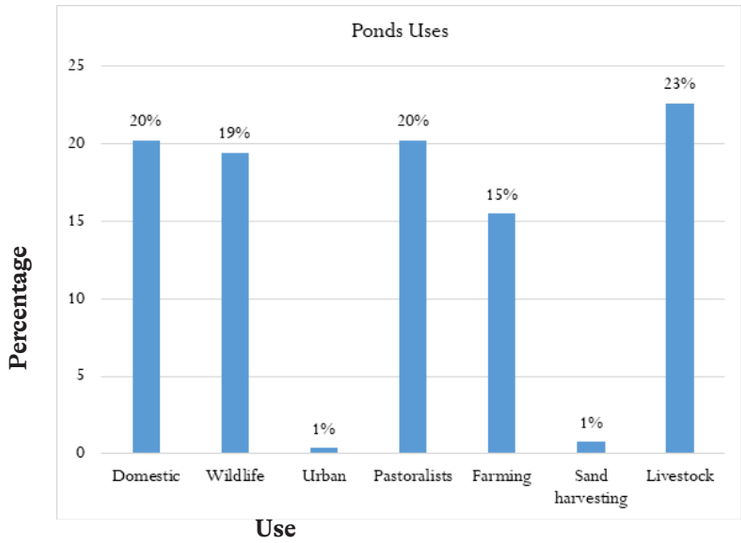


Figure 12: Pond Uses in Laikipia County

3.4.3 Tenure

From the total of **309 ponds** recorded in Laikipia County, these ponds are distributed across different land tenure categories as follows:

- **145 ponds (47%)** are located on **community land,** where access and use are primarily managed through customary governance systems, grazing committees, or community water user associations.
- **84 ponds (27%)** fall under **public land**, including areas managed by the county government or designated for communal use.
- **80 ponds (26%)** are situated on **private land**, mainly within private ranches, conservancies, and large-scale agricultural holdings.

This distribution highlights the critical role of community-managed water resources in supporting Laikipia's pastoral and agro-pastoral livelihoods, while also emphasizing the need for integrated and equitable water governance across tenure systems.

3.4.4 Management

Water ponds are vital assets in Laikipia's dryland ecosystems, serving as critical sources of water for livestock, wildlife, and, in some cases, domestic use. However, without proper management and goervance, these ponds often face challenges that undermine their sustainability and the well-being of the communities and ecosystems that depend on them. The distribution of management count from the mapping initiative is as presented in Table 8.

Table 8: Water Ponds Management in Laikipia County

Management Type	Count
Community Conservancy	78
Community Conservancy, Kenya Wildlife Service (KWS), Kenya Forest Service (KFS)	1
Community Water Project	29
Forest Resource Association, KFS, Community Conservancy	1
Kenya Forest Service (KFS)	7
KFS, Kenya Wildlife Service (KWS)	1
KWS, KFS	1
Water Resource User Association (WRUA)	3
Private Management	64
Other	122
Other, Community Water Project	1
Other, KFS	1
Grand Total	309

3.4.5 Threats

Water ponds in Laikipia County face several threats, including climate change, deforestation, and land degradation. These issues lead to decreased groundwater recharge, increased runoff, and water scarcity, impacting the sustainability of water ponds. Furthermore, water conflicts, pollution and catchment destruction pose additional challenges to water pond resources in the county.

3.4.6 Opportunities

Water ponds present significant opportunities for enhancing sustainable development, climate resilience, and livelihood support in Laikipia's dryland environment. Key opportunities include:

- **Strengthening climate adaptation and drought resilience:** Water ponds offer a reliable water source during dry seasons and drought periods, helping to buffer communities, livestock, and wildlife against water scarcity.
- **Enhancing livestock productivity:** By improving access to watering points, ponds reduce long-distance livestock migrations, which can lower stress on animals and contribute to better livestock health and productivity.
- **Supporting biodiversity and ecosystem health:** Ponds provide critical habitats for aquatic and semi-aquatic species, contributing to the conservation of local biodiversity and maintaining ecological balance.
- **Promoting small-scale irrigation and farming:** Where feasible, water from ponds can be used to support small-scale agriculture and kitchen gardens, improving food security and household nutrition.
- **Facilitating integrated water resource management (IWRM):** Water ponds can be incorporated into broader catchment management strategies, including rainwater harvesting, sand dams, and soil and water conservation measures.
- **Opportunities for community-led water governance:**Management and maintenance of ponds can promote community participation, ownership, and equitable access to water resources.
- **Potential for eco-tourism and nature-based enterprises:** In areas with rich biodiversity around ponds, there is potential to develop low-impact eco-tourism initiatives that generate income while conserving natural resources.
- **Reducing human-wildlife conflict:** Strategically located ponds can help disperse wildlife and reduce competition for water at limited points, minimizing conflicts between wildlife and pastoral communities.

3.5 Water Springs

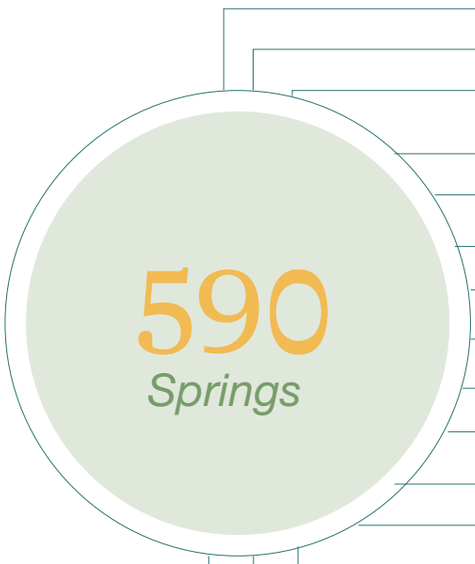
3.5.1 Numbers and Spatial Distribution

Springs are vital water sources in Laikipia County, particularly within its dryland ecosystems where surface water is often scarce or seasonal (Plate 12). They provide a reliable supply of fresh water that supports livestock, wildlife, domestic use, and in some areas, small-scale irrigation and ecological functions. Springs are crucial for pastoralist communities as they sustain both human and animal life during dry seasons and drought periods, contributing directly to the resilience of local livelihoods.

The number of springs recorded in Laikipia county were 590 counts, observed in 14 wards in the county. Relatively, high occurrence of springs is observed in Sosian Ward (118) followed by Mukogodo East (110) and Igwamiti (96). The wards, Nanyuki, Tigithi , Rumuruti Township, Umande and Ol Moran had relatively low distribution of springs in the county (Table 9, Fig 13). Thingithu ward registered no ponds. The concentration of springs in areas such as Sosian, Mukogodo East, and Igwamiti reflects variations in underlying geology, topography, and rainfall patterns. On the other hand, the relatively low occurrence in wards like Nanyuki, Tigithi, Rumuruti Township, Umande, and Ol Moran, and the complete absence in Thingithu Ward, underscores the need for targeted water resource development and management interventions in these areas.

1. *Nyanyawa Spring, Lorien location, Laikipia county*
2. *Kijabe spring, Mwituria location, Laikipia county*
3. *Asman spring, Olmoran location, Laikipia county*
4. *kwa Kimondo spring, Salama location, Laikipia county*

Table 9: Springs in Laikipia County



Ward	Spring
Githiga	28
Igwamiti	96
Marmanet	75
Mukogodo East	110
Mukogodo West	26
Nanyuki	6
Ngobit	26
Ol Moran	17
Rumuruti Township	18
Salama	30
Segera	21
Sosian	118
Thingithu	
Tigithi	5
Umande	14

Plate 12: Seasonal spring in Ilngwesi location

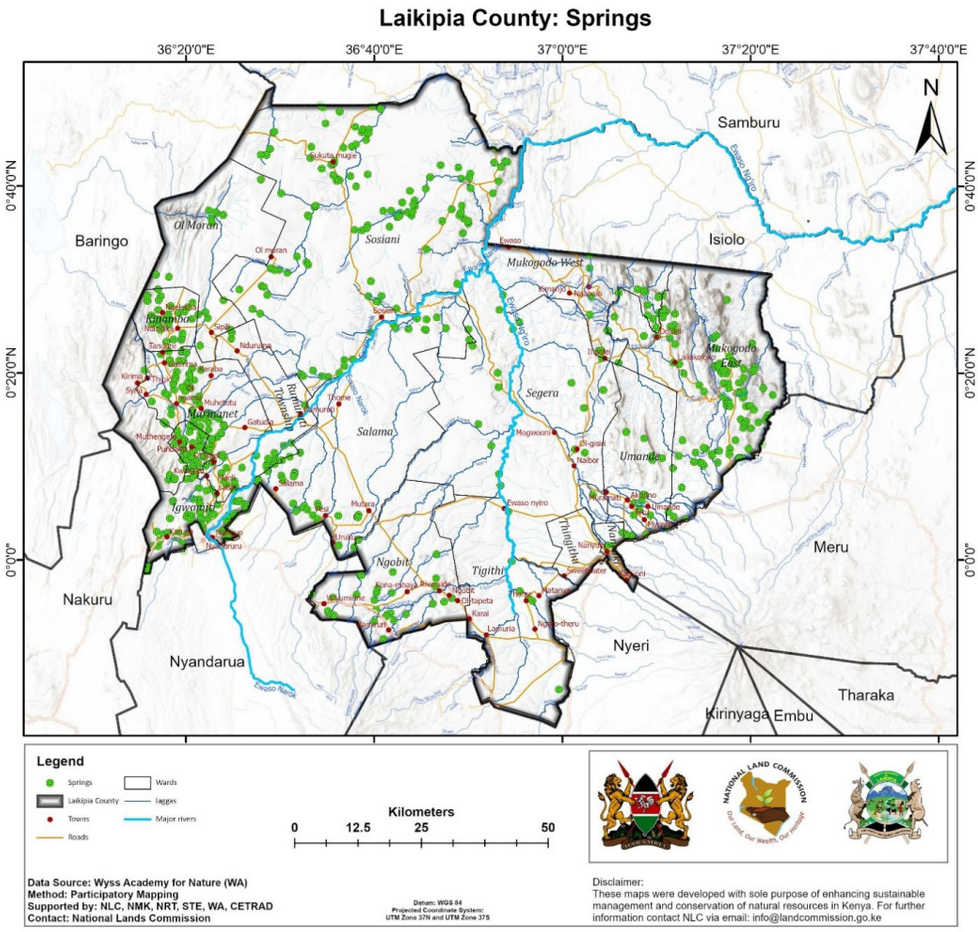


Figure 13: Spatial Distribution of Springs in Laikipia County

3.5.2 Uses of Springs

The existing springs within Laikipia County support a wide range of uses that are critical to both livelihoods and ecosystems. The main uses of water from these springs include livestock watering, domestic consumption, wildlife support, pastoralism, farming, and in some cases, urban use (Fig. 14). These springs play an essential role in sustaining communities, agriculture, and biodiversity, particularly in the county's dryland areas where alternative water sources are limited.

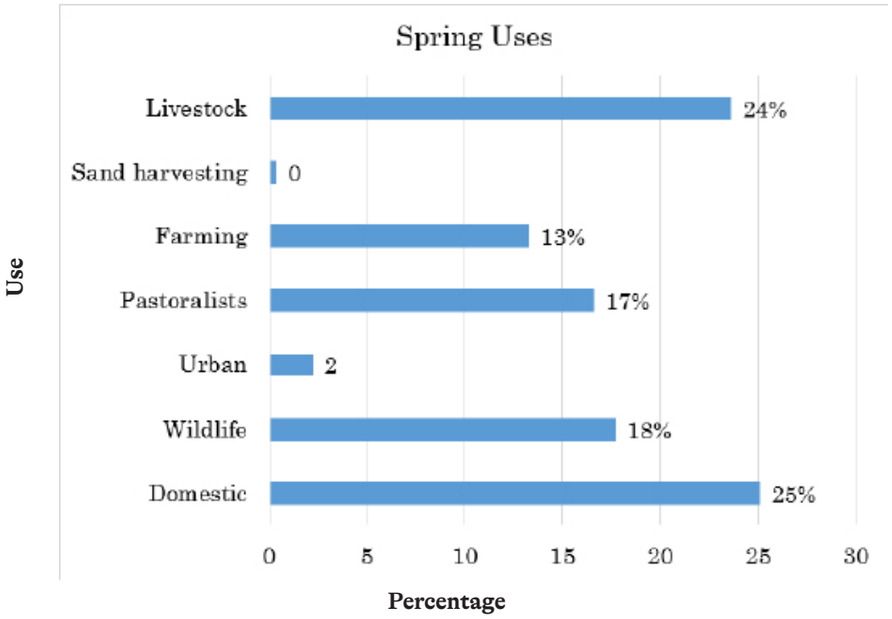


Figure 14: Springs Uses in Laikipia County

3.5.3 Tenure

The mapping exercise identified springs distributed across different land tenure systems as follows:

- **Private land springs (301)** — The largest proportion of mapped springs are located on private land (e.g., ranches, conservancies, private farms). This highlights the critical role of private landowners in the stewardship and accessibility of water sources in Laikipia.
- **Community land springs (170)** — These springs are vital for communal livestock watering, domestic use, and in some cases, wildlife. They are often managed through traditional systems or organized committees.
- **Public land springs (117)** — These are typically in forest reserves, riparian zones, or other public areas. They are important for both ecological integrity and public water supply but may face management challenges due to weak institutional oversight.

The distribution of springs across community, private, and public land tenure systems has important implications for water security, equity, governance, and ecosystem resilience in Laikipia's drylands (Table 10).

Table 10: Water Springs Tenure Typologies`

Tenure Type	Number of Springs	% of Total	Key Implications
Private	301	~51%*	Access controlled by landowners; risk of restricted community/wildlife access; potential for stronger individual investment in protection.
Community	170	~29%*	Critical for pastoralists; communal governance systems apply; vulnerable to overuse and governance challenges without support.
Public	117	~20%*	Essential for general public and wildlife; management often weak or fragmented; prone to degradation without clear oversight.

3.5.4 Threats and Challenges

Springs in Laikipia County face various threats, including human encroachment, over-extraction of water from springs, unplanned development, deforestation, unplanned grazing, and the impacts of climate change. These threats can lead to reduced groundwater recharge, increased runoff, and ultimately influence water availability for communities and wildlife.

3.5.5 Opportunities

Laikipia County presents several opportunities for spring protection and development, primarily driven by the need to improve water access, especially in the northern parts of the county. These opportunities include rehabilitation and maintenance of existing springs; which is crucial ensuring their continued functionality and water quality, community involvement in spring protection and management which is vital for long-term sustainability as well as creating new springs through groundwater abstraction, enhancing existing springs and implementing rainwater harvesting and storage systems

3.6 Wetlands (Swamps and Marshes)

3.6.1 Numbers and Spatial Distribution

According to the Ramsar Convention, wetlands are defined by type as areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water, the depth of which at low tide does not exceed six meters (Plate 12). Often misunderstood as a wasteland, wetlands are crucial for the planet, providing essential ecosystem services and supporting diverse plant and animal life including a wide variety of habitats like marshes, swamps, bogs, mangroves, and floodplains.

From the asset mapping, a total of about 220 swamps/marshes counts in Laikpia County (Table 11 and Figure 15. The highest concentration of wetlands was mapped in Igwamiti (51), Marmanet (48), and Sosian (41) wards — areas that may serve as critical ecological zones for biodiversity, water regulation, and pastoral livelihoods.Wards like Nanyuki and Thingithu had no wetlands mapped, reflecting their urbanized or dryland nature. Wetlands in Mukogodo West, Umande, and Tigithi were very limited, indicating the need for targeted conservation or alternative water security strategies.

1. *Aiyam wetland, Sosian location, Laikipia county*
2. *Sugutan wetland, Thome location, Laikipia county*
3. *Rural wetland, Igwamiti location, Laikipia county*

Plate 13: A Swamp/Marsh Areas in Laikipia County

Table 11: Surveyed Springs in Laikipia County

Ward	Wetlands (Swamps/ Marshes)
Marshes)	28
Githiga	12
Igwamiti	51
Marmanet	48
Mukogodo East	8
Mukogodo West	1
Nanyuki	0
Ngobit	12
Ol Moran	12
Rumuruti Township	11
Salama	11
Segera	10
Sosian	41
Thingithu	0
Tigithi	2
Umande	1

220
Wetlands (Swamps and Marshes)

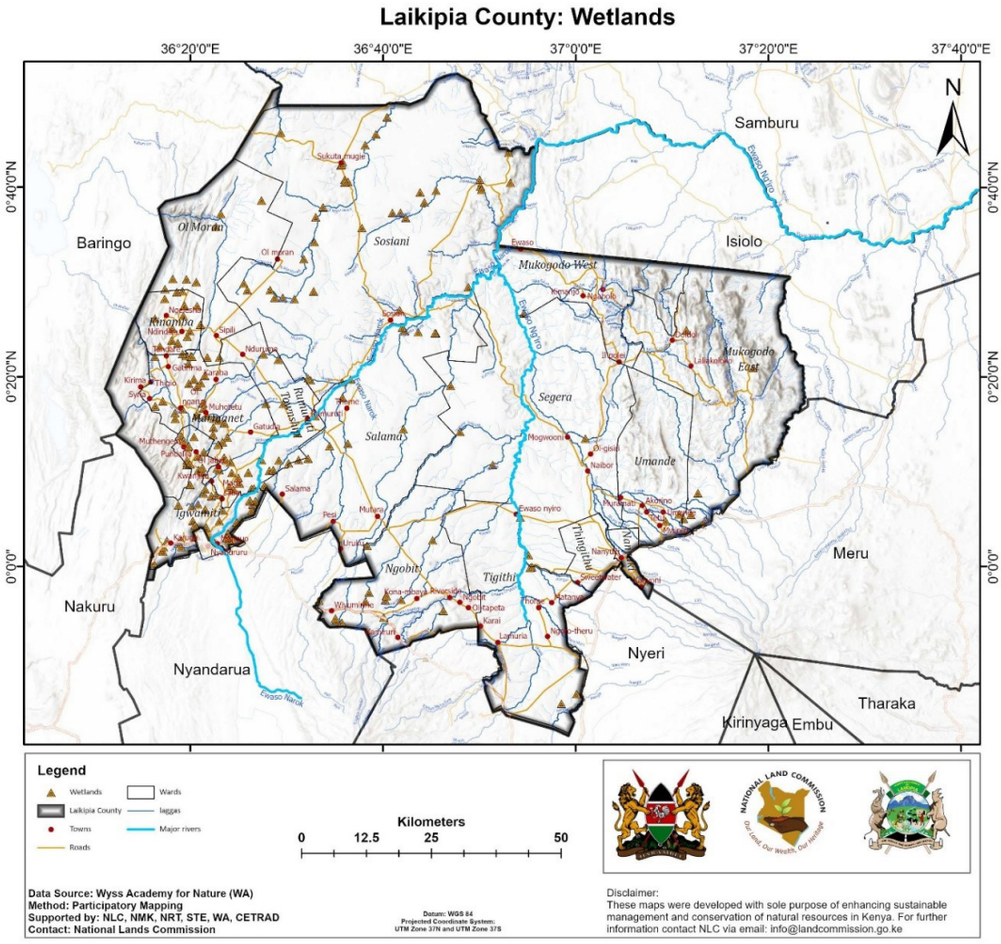


Figure 15: Spatial Distribution of Wetlands in Laikipia County

3.6.2 Uses

Laikipia County utilizes sand dams, a low-cost water storage technique, to address water scarcity, particularly in areas with seasonal rivers. These structures, essentially walls built across riverbeds, trap water during the rainy season and hold it through dry periods, providing a reliable water source for communities, livestock, and wildlife.

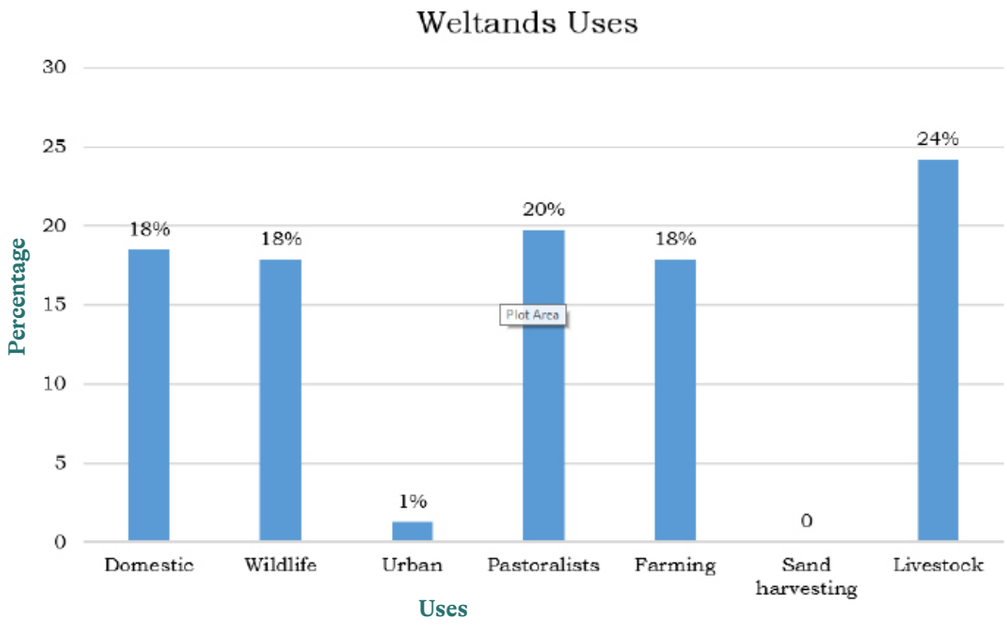


Figure 16: Wetland Uses in Laikipia County

3.6.3 Management

Private management (93 wetlands) represents the largest share, reflecting Laikipia's land ownership patterns where private ranches, farms, and conservancies control significant wetland areas. Community-based management (Community, Conservancies, Water Projects) collectively manages at least 73 wetlands, highlighting strong local engagement in wetland stewardship. Kenya Forest Service (alone or in partnerships) oversees at least 27 wetlands, likely in forested or riparian public lands. Unmanaged wetlands (20) are vulnerable to degradation, encroachment, and unregulated use, making them priority targets for intervention. In summary, wetland management in Laikipia is diverse, with significant opportunities to enhance collaboration between private, community, and public actors. Unmanaged wetlands and fragmented oversight present risks that could be addressed through integrated planning and co-management strategies (Table 12).

Table 12: Springs Management Type in Laikipia County

Management Type	Number of Wetlands
Community	23
Community and Local Government	1
Community Conservancy	21
Community Conservancy + Community Water Project + WRUA	1
Community Water Project	27
Community Water Project + Kenya Forest Service	1
Forest Resource Association + Kenya Forest Service	1
Kenya Prison Service	1
Kenya Forest Service (KFS)	24
KFS + Forest Resource Association	1
KFS + Kenya Wildlife Service (KWS)	1
KWS + KFS	1
Water Resource User Association (WRUA)	2
WRUA + Private Management	1
Private Management	93
Public (unspecified agency)	1
None (Unmanaged)	20
Total	220

3.6.4 Threats and Challenges

Laikipia's wetlands are increasingly under pressure from a range of environmental and human-induced threats that undermine their ecological integrity and the vital services they provide. The key threats include:

- **Climate change:** Rising temperatures, erratic rainfall patterns, and prolonged droughts associated with climate change are leading to reduced water availability and wetland desiccation.
- **Deforestation and land degradation:** Destruction of surrounding vegetation and catchment areas accelerates soil erosion, reduces groundwater recharge, and destabilizes wetland ecosystems.
- **Land use change and human encroachment:** Expansion of settlements, farms, and infrastructure into wetland areas leads to habitat loss, fragmentation, and disruption of natural water flows.
- **Illegal water abstraction and pollution:** Unregulated withdrawal of water for irrigation, livestock, and domestic use diminishes wetland water levels, while pollution from agrochemicals, solid waste, and human activities degrades water quality.
- **Unplanned grazing and overstocking:** Uncontrolled livestock numbers and unsustainable grazing patterns damage wetland vegetation, compact soils, and reduce the regenerative capacity of these ecosystems.
- **Competition between livestock and wildlife:** Increasing competition for water and pasture, especially during dry seasons, exacerbates the pressure on wetlands and can contribute to human-wildlife conflict.

3.6.5 Opportunities

Laikipia wetlands conservation offers numerous opportunities that can contribute to sustainable development, biodiversity protection, and the well-being of local communities. Key opportunities include:

- **Supporting local livelihoods through sustainable use:** Wetlands provide essential resources such as water for livestock, small-scale irrigation, and raw materials (e.g. reeds for crafts). Conservation initiatives can support these uses while ensuring the long-term health of the wetlands.
- **Implementing sustainable land and water management practices:** Wetland conservation offers a platform to integrate soil and water conservation, rangeland management, and restoration of degraded lands, thereby improving overall ecosystem health and resilience.
- **Enhancing climate change resilience:** Healthy wetlands act as natural buffers against drought, floods, and other climate-related shocks, helping communities adapt to changing climatic conditions.
- **Promoting eco-tourism and nature-based enterprises:** Well-managed wetlands can attract visitors interested in birdwatching, cultural tourism, and nature-based experiences, creating opportunities for income generation and employment at the local level.
- **Strengthening collaborative governance and partnerships:** Wetland conservation provides an entry point for building partnerships between communities, county government, NGOs, and private stakeholders to promote integrated resource management.

3.7 Rock Catchments

3.7.1 Numbers and Spatial Distribution

Rock catchments are rainwater-harvesting systems that utilize the impervious surfaces of rock outcrops to collect and store runoff for various purposes (Plate 14), particularly in drylands where water scarcity is a major challenge. They function by channeling rainwater from the rock surface into a reservoir or storage tank, providing a reliable water source for domestic use, livestock watering, and even agricultural applications.

In Laikipia county, rock catchments are only distributed only in 5 out of the 15 wards (Table 13). Mukogodo West (35) and Mukogodo East (14) together account for nearly 69% of the mapped rock catchments, reflecting the reliance of these arid and rocky landscapes on natural rock outcrops for water harvesting. Umande (11) and Segera (9) also feature notable numbers of rock catchments, supporting water access in dry zones. Several wards (e.g. Githiga, Nanyuki, Rumuruti Township) have no rock catchments mapped, likely due to different geological formations or urban/agricultural land use patterns.

1. *Pool Zamani rock catchment, Naibor Location, Laikipia county*
2. *Ilpolei Rock catchment, Ilpolei location, Laikipia county*
3. *Olkinyei Rock catchment, Makurian location, Laikipia county*

Table 13: Surveyed Rock Catchments in Laikipia County

220
Rock Catchments

Ward	Rock Catchment
Githiga	
Igwamiti	
Marmanet	
Mukogodo East	14
Mukogodo West	35
Nanyuki	
Ngobit	
Ol Moran	
Rumuruti Township	
Salama	
Segera	9
Sosian	2
Thingithu	
Tigithi	
Umande	11
Grand Total	71
None (Unmanaged)	20

Plate 14: Rock catchment in Olborsoit location

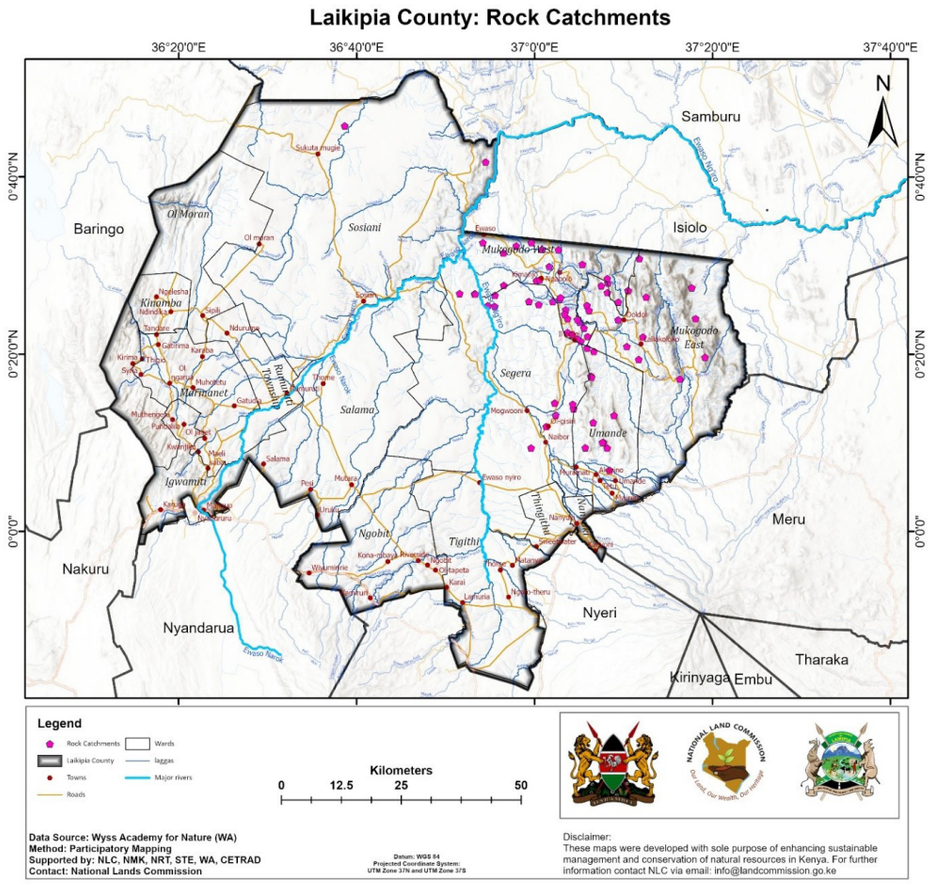


Figure 17: Spatial Distribution of Rock Catchments in Laikipia County

3.7.2 Uses

The existing rock catchments within Laikipia County support a wide range of critical uses that sustain both livelihoods and ecosystems. The primary uses of water from these catchments include **livestock watering, domestic consumption, wildlife support, pastoralism, and farming** (Fig. 18). In addition, some rock catchments contribute to **sand harvesting activities** and provide supplementary water for small-scale agricultural practices.

These catchments are particularly valuable in arid and semi-arid regions, where natural surface water sources are scarce or seasonal. They serve as essential water reservoirs, helping communities and ecosystems cope with dry spells and prolonged droughts, and play a significant role in supporting the resilience of Laikipia's dryland landscapes.

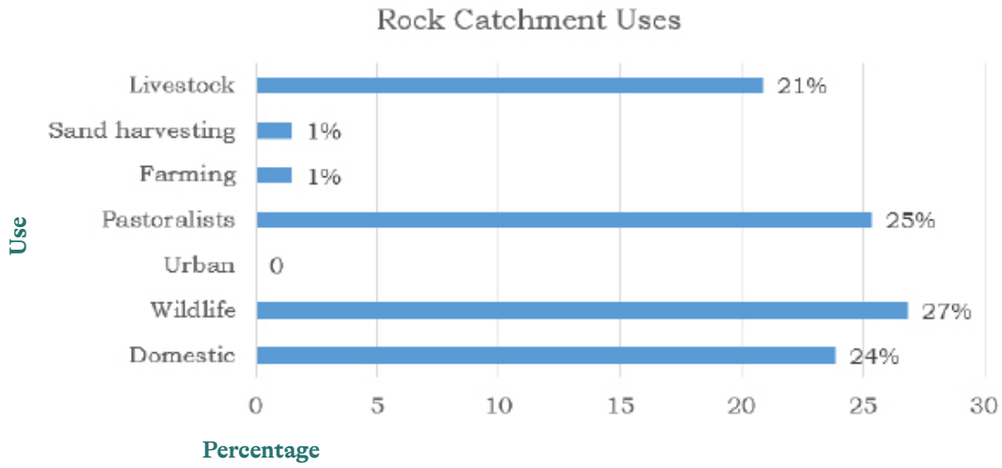


Figure 18: Rock Catchments Uses in Laikipia County

3.7.3 Management

The majority of rock catchments are under community stewardship, either through community conservancies, water projects, or traditional community governance (Table 14). This highlights the importance of local institutions in sustaining water access in dryland areas. A substantial number of rock catchments are on private lands (e.g. private conservancies, ranches, or farms), where access may be more controlled but investment in maintenance may be stronger. Unmanaged sites (6 rock catchments) — these are at higher risk of degradation, pollution, or unregulated use, making them priority targets for management interventions or co-management agreements.

The dominance of community and conservancy management offers an opportunity to strengthen local capacity and governance structures through technical and financial support. Unmanaged catchments pose risks to water security and environmental integrity, and could benefit from formal management arrangements. Rock catchments under private management may offer models for investment in water infrastructure, but equitable access during droughts needs careful negotiation.

Table 14: Surveyed Rock Catchments in Laikipia County

Management Type	Number of Rock Catchments
Community	11
Community Conservancy	26
Community Water Project	5
Private Management	23
None (Unmanaged)	6
Grand Total	71
Total	220

3.7.4 Threats and Challenges

Rock catchments are vital for water harvesting in Laikipia's arid and semi-arid zones. However, their sustainability is undermined by a range of threats and management challenges as presented in Table 15. Addressing these challenges requires strengthening management systems, securing catchment areas, investing in rehabilitation, and integrating rock catchments into broader land use and water resource planning.

Table 15: Threats and Challenges Facing Rock Catchments in Laikipia County

Threat / Challenges	Number of Rock Catchments
Siltation and erosion	Surrounding soil erosion leads to sediment build-up, reducing storage capacity and requiring frequent desilting.
Overuse and unregulated access	Uncontrolled use, especially at unmanaged sites, degrades infrastructure and water quality, and can cause conflicts.
Weak or fragmented management	Overlapping or unclear roles between community groups, conservancies, and private managers lead to poor maintenance and accountability gaps.
Encroachment and land use change	Settlement expansion, cultivation, or infrastructure can block runoff or damage catchment structures, reducing water inflow.
Vandalism and infrastructure damage	Theft or destruction of gutters, tanks, and pipes undermines catchment functionality and increases maintenance costs.
Climate variability	Reduced or erratic rainfall lowers water yields; extreme storms cause damage and increase erosion.

3.7.5 Opportunities

Rock catchments in Laikipia represent not only critical water sources but also important entry points for building climate resilience, improving livelihoods, and strengthening natural resource governance. Key opportunities are summarised in Table 16.

Table 16: Opportunities for Rock Catchments in Laikipia County

Opportunity	Potential Benefits / Description
Water security enhancement	Expanding and rehabilitating rock catchments can significantly improve water availability for livestock, wildlife, and domestic use, particularly in arid zones (e.g., Mukogodo).
Community-driven co-management	Rock catchments provide a platform to strengthen or establish community conservancies, WRUAs, and water committees, enhancing local governance and ownership.
Nature-based solutions for resilience	Rock catchments, combined with catchment restoration (e.g., re-vegetation, erosion control), can reduce land degradation and improve ecosystem services.
Cost-effective infrastructure scaling	Many rock catchments can be upgraded or expanded at relatively low cost compared to dams or boreholes, making them viable for donor and county government investment.
Integration into land use plans	Rock catchments can be mapped and protected through County Spatial Plans, Conservancy Management Plans, and Grazing Plans, ensuring their sustainability.
Eco-tourism and conservation linkages	Well-maintained rock catchments can support wildlife in conservancies and tourism zones, contributing to biodiversity conservation and tourism revenue.
Climate change adaptation funding	Rock catchment rehabilitation and protection projects align with climate adaptation priorities, opening opportunities for funding through climate finance (e.g. GCF, Adaptation Fund).

3.7.6 Water Seasonality and Availability

Laikipia County experiences significant spatial and temporal variability in water availability, driven by its semi-arid climate, diverse topography, and changing land use patterns. The county's water resources — including rivers, springs, wetlands, and rock catchments — are critical in supporting the needs of humans, livestock, and wildlife. However, the availability of these resources is highly dependent on seasonal rainfall patterns and is subject to fluctuations throughout the year (Fig. 19).

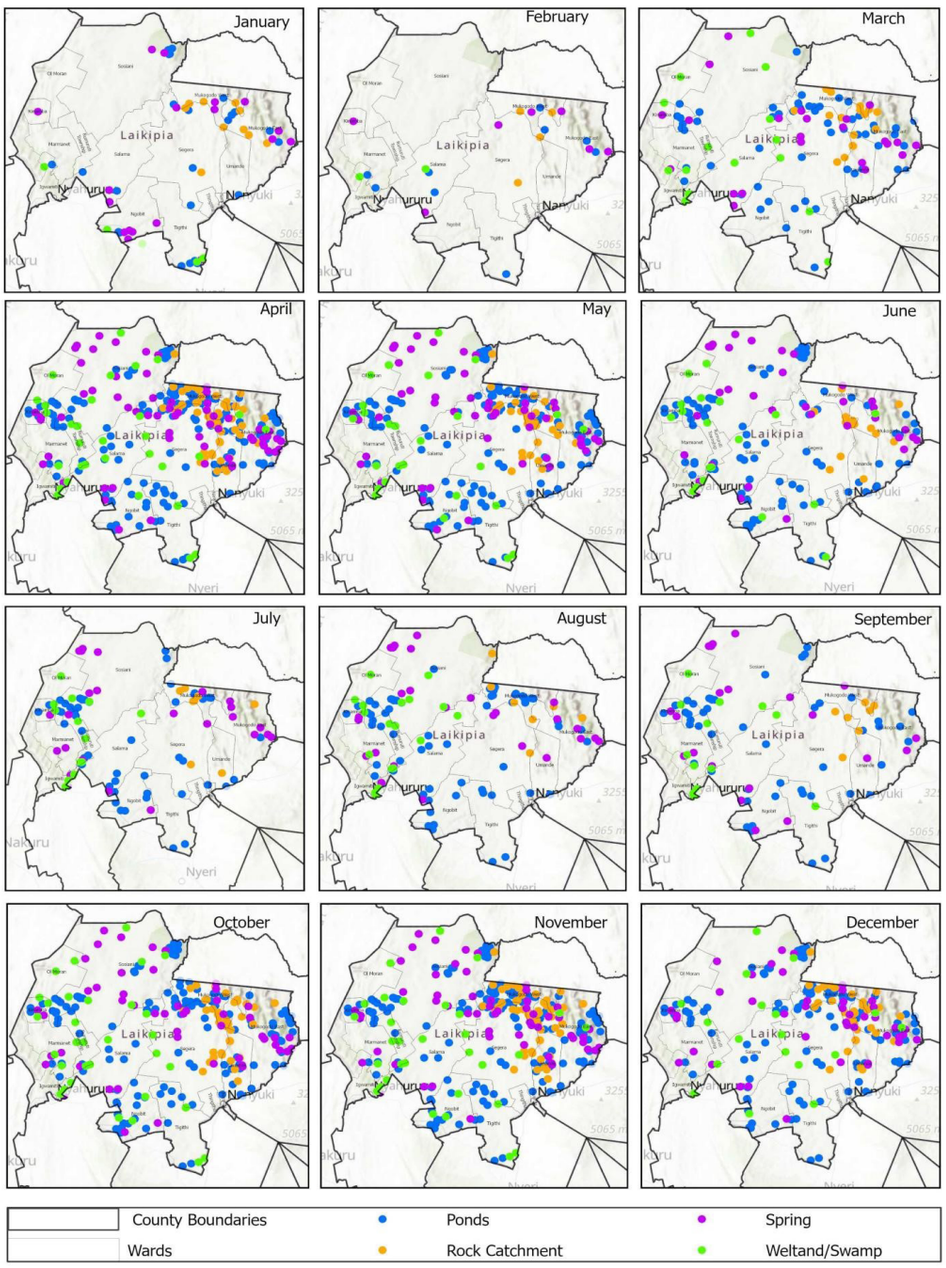


Figure 19: Seasonal Water Availability in Laikipia County

Mapping data revealed that water availability in Laikipia County undergoes marked seasonal changes. The months of January and February are typically characterized by water scarcity, as they coincide with the dry spell during which most water sources diminish significantly. With the onset of the long rains in March, April, and May (MAM), water availability improves across the county, replenishing rivers, ponds, springs, and catchments for various uses. A similar trend is observed during the short rainy season of October, November, and December (OND), which provides another critical period of water recharge for ecosystems and communities. This general pattern of seasonal water availability and its spatial distribution across Laikipia is visually depicted in, illustrating the close relationship between rainfall patterns and water resource dynamics in the county.

3.8 Water Catchment Areas

Laikipia County, located in Kenya's central highlands, serves as a critical water tower in the arid and semi-arid landscapes of northern Kenya. Despite its semi-arid classification, the county hosts several key water catchment areas that support diverse land uses including agriculture, pastoralism, domestic consumption, wildlife conservation, and tourism. These catchments form the headwaters of rivers that flow into the larger Ewaso Ng'iro North River Basin, a lifeline for ecosystems and communities in Laikipia and downstream counties like Isiolo, Samburu, and Garissa. They include:

- **The Ewaso Ng'iro North Catchment** is the largest and most significant in the county. It is fed by numerous tributaries that originate from the Mount Kenya Forest on the eastern edge and the Aberdare Ranges to the southwest. Rivers such as the Nanyuki, Burguret, Ngobit, Likii, and Ngare Ndare arise from the forested highlands of Mount Kenya and provide perennial flow for irrigation, livestock, and domestic use, particularly in and around the towns of Nanyuki and Timau.
- **In western Laikipia, rivers such as Pesi** emerge from the Aberdare Ranges, contributing to the catchment that drains toward Lake Baringo and supporting large-scale ranches and farming settlements. These rivers are vital for maintaining both water supply and the ecological integrity of downstream habitats.
- **In northern Laikipia, the Mukogodo Forest Catchment** plays a less visible but equally crucial role. While the region is characterized by seasonal streams, it harbors critical springs and shallow aquifers that act as drought refuges for pastoralist communities and wildlife. The forest, inhabited by the Indigenous Yaaku and Maasai, plays a central role in conserving these hydrological resources through traditional stewardship.

From the mapping exercise and the subsequent ground truthing exercise in Luoniek Location, parcel LR No. 1092 (Luoniek) is an important water catchment area for locals. The parcel is rich in Mtamayo and Acacia tree species and play a critical role as a grazing areas for both livestock and wildlife (Plate 15). Despite its critical role, the catchment area face significant threats including the ongoing inter-tribal violence over pasture and water access, mainly involving Pokot and neighbouring groups as well as severe charcoal burning. Additionally, climate change-induced variability in rainfall patterns has led to more intense droughts and floods, further stressing the fragile catchment systems. These challenges exacerbate competition over water among wildlife, pastoralists, and farmers, often leading to conflict.

Protecting and sustainably managing Laikipia's water catchments is essential not only for local resilience but also for the survival of broader ecosystems and downstream communities that depend on the Ewaso Ng'iro system. Collaborative watershed management, reforestation of upland forests, enforcement of water-use regulations, and investment in water harvesting infrastructure are crucial steps toward ensuring water security in this ecologically and economically strategic county.

Plate 15: Louniek Water Catchment Area (LR No. 1092) – Louniek Location

3.9 Wildlife Resources

Laikipia County is richly endowed with wildlife, widely distributed in most parts of the county extending to Aberdares Forest, Samburu, Meru, and Mt. Kenya wildlife corridors (Figure 20). Most of the wildlife is found in the large-scale private ranches, which occupy over 50 per cent of the total land area of the County. The forest and surrounding group ranches are in the core of Kenya's Laikipia–Samburu ecosystem, which hosts the country's second highest density of wildlife – including the highest concentration of elephants outside of protected areas. The forest reserve hosts a critical corridor of regular elephant movement between Samburu lowlands, the Laikipia plateau and Mt. Kenya Forest Reserve.

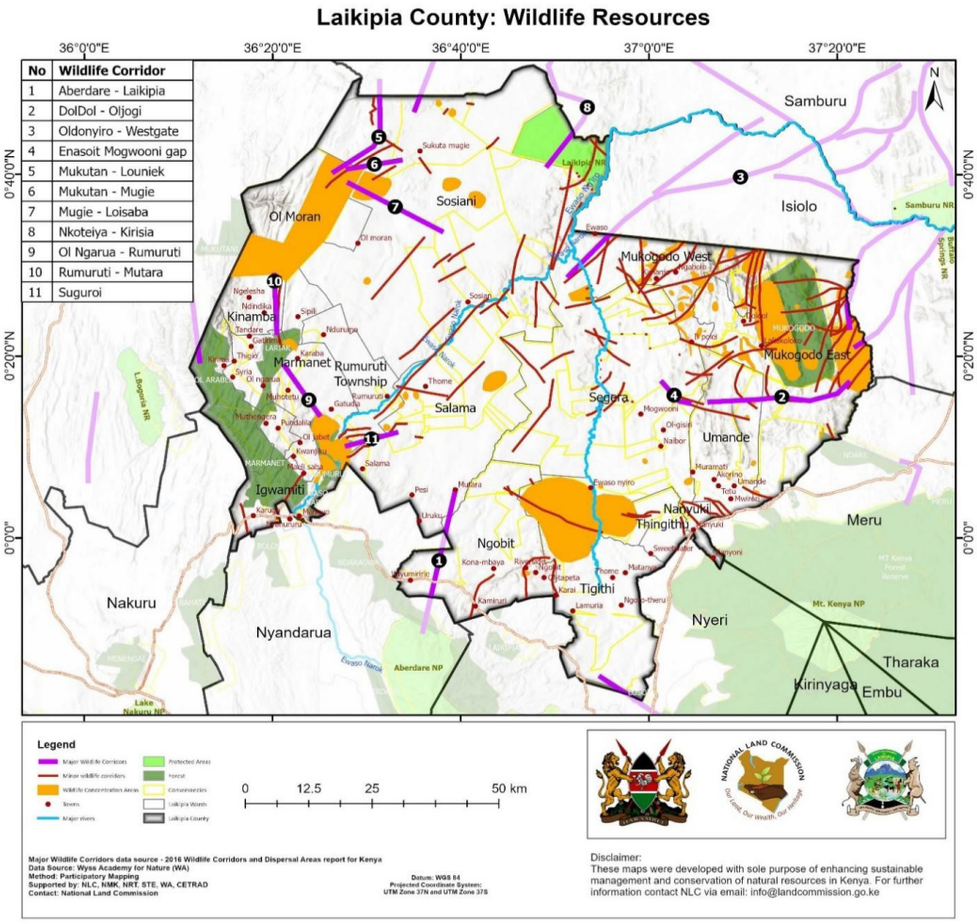


Figure 20: Wildlife Resources in Laikipia County

3.9.1 Wildlife Concentration Areas

Wildlife concentration areas, also known as local wildlife sites or conservation areas, are specific regions that have a high number of different animal and plant species (Fig.21). These areas are often protected or designated for conservation efforts, and they play a vital role in maintaining biodiversity. There are prominent concentration areas for wildlife in Laikipia County; these are majorly Mukogodo forest, Naibunga, North of Ol Moran to Mugie conservancy, Tigithi ward and Olpejeta, East of Igwamiti close to the Aberdare's forest and the ranches such as Segera and Loisaba. These areas are key for the wildlife security and during wet and dry seasons. The connectivity is thus important to and from one area to another. The corridors connect these zones and wildlife make trips during migratory seasons for food and water (Figure 22-23).

Figure 21: Ngare ndare wildlife concentration area, Ethi location

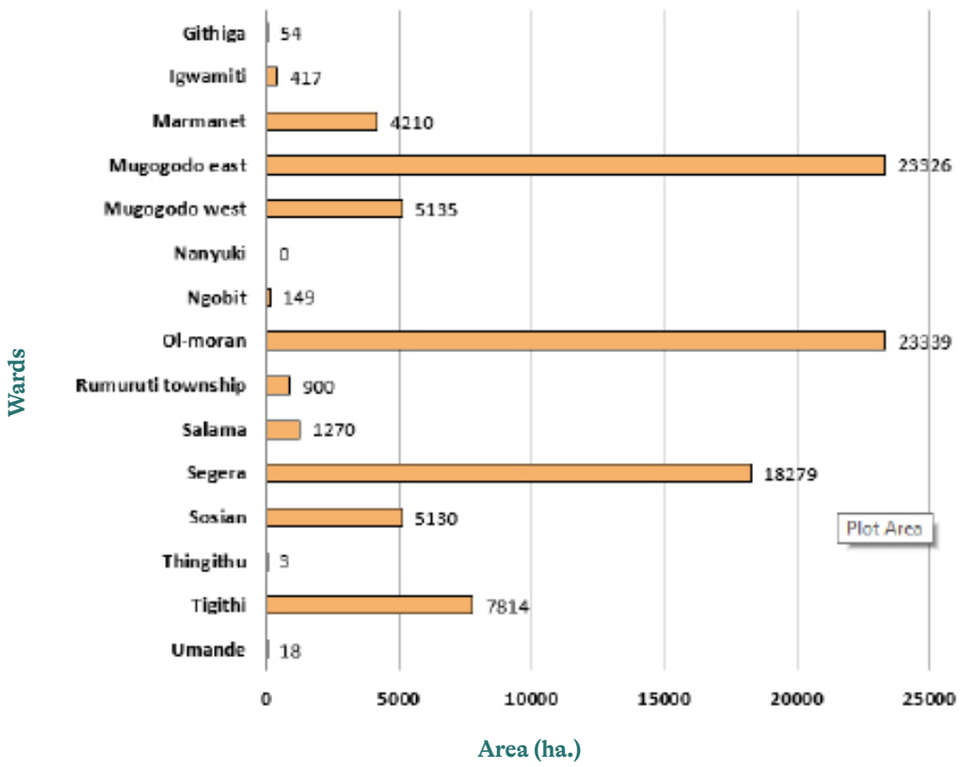


Figure 22: Total area of wildlife concentration area (ha) by wards in Laikipia County

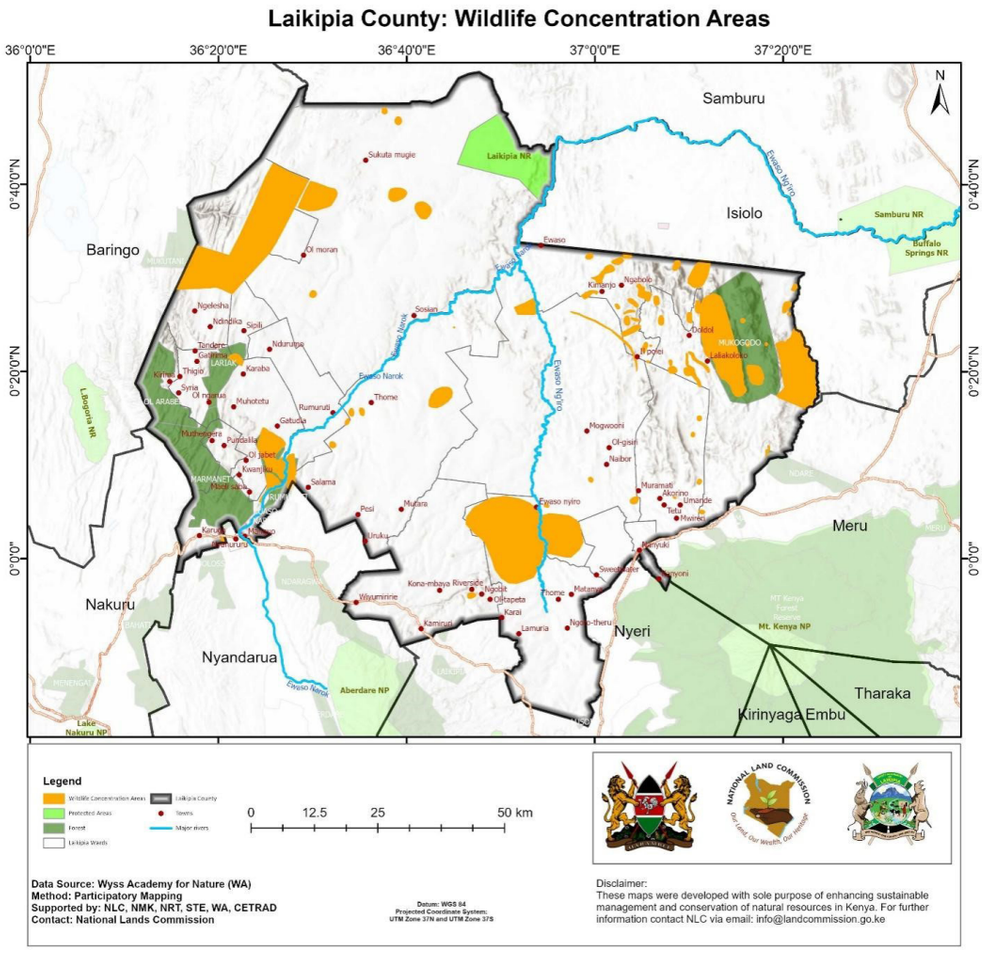


Figure 23: Wildlife Concentration Areas in Laikipia County

3.9.2 Wildlife Corridors and Dispersal Areas

Wildlife corridors and dispersal areas are crucial for the health and survival of wildlife populations, particularly in fragmented landscapes. While much of Kenya's wildlife depends on the protection of parks and reserves, healthy wildlife populations also need access to resources in the broader landscape outside protected areas. Animals disperse or migrate across landscapes to access vital resources such as pasture, water, and breeding grounds; to reduce the risks of predation; and to enhance genetic health. From the asset mapping, a total of 1,030 km wildlife corridors and dispersal areas were recorded in Laikipia County with Mukokodo, East, Mukogodo West, Segera and Sosian recording the highest distances. (Figure 24).

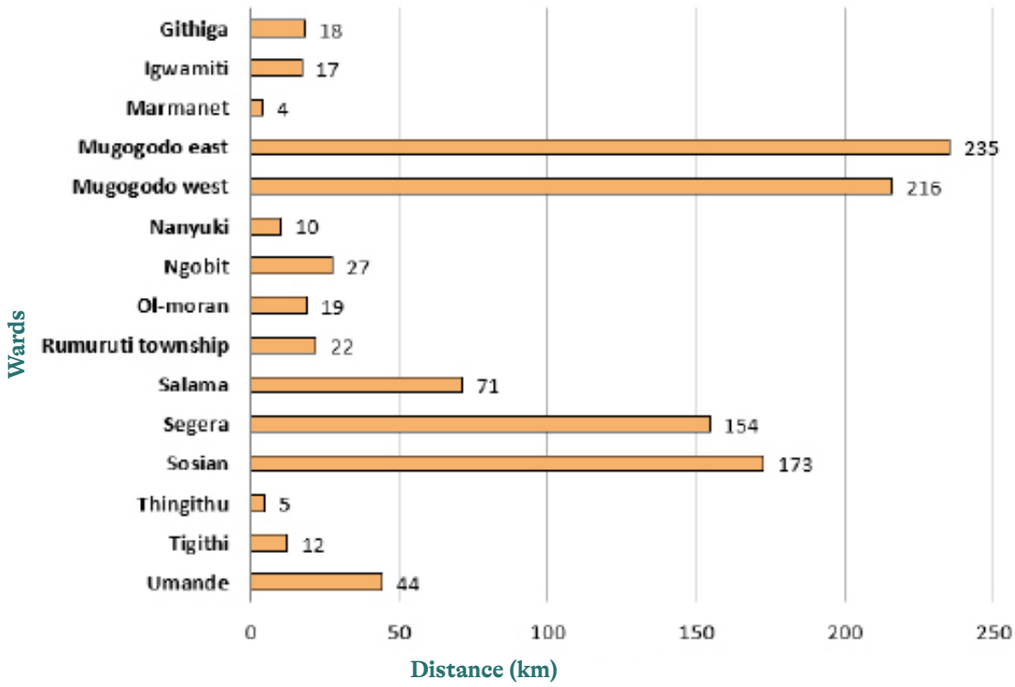


Figure 24: Estimated distance (km) of wildlife corridors

The key wildlife corridors and dispersal areas mapped (Figure 25) include:

1. The **Aberdare-Laikipia wildlife corridor** is an essential ecological passage that connects the **Aberdare Range** (a major water tower and forested ecosystem) with the **Laikipia plateau** (a mosaic of ranches, conservancies, and communal lands).This corridor allows free movement of wildlife — especially large mammals like **elephants**, **buffaloes**, and **big cats** — between these two key ecosystems, ensuring:
   - » **Genetic diversity** by preventing isolated wildlife populations.
   - » **Seasonal migration** routes for access to water and pasture.
   - » **Conflict mitigation** by guiding wildlife away from human settlements.
2. **Doldol-Oljogi wildlife corridor** - is a vital migratory route connecting: **Doldol area** (communal Maasai lands in northern Laikipia) to the **Oljogi Conservancy** (a well-managed private conservancy in central Laikipia). This corridor facilitates **north-south wildlife movement** across Laikipia, linking: community lands (e.g., Il Ngwesi, Lekurruki conservancies) to private conservancies (e.g., Oljogi, Ol Pejeta, Solio). It serves as part of a larger landscape connection between **northern rangelands** and **central Kenya's forested highlands** (Aberdares, Mount Kenya).
3. **Oldonyiro-Westgate corridor**- is a vital ecological passage linking **Oldonyiro area** (at the interface of Laikipia and Samburu counties) to **Westgate Community Conservancy** (part of the greater Samburu landscape under the Northern Rangelands Trust). This corridor enables wildlife to move between **Laikipia's community lands and private conservancies** and **Samburu's community conservancies and protected areas (e.g., Samburu National Reserve).** It forms part of a larger north-south connectivity system crucial for wildlife movement between the **Laikipia plateau, Samburu**, and further north into the **Mathews Range**.
4. **Enasoit-Mogwooni gap**- represents a natural break or passage that links **Enasoit Conservancy** (a private wildlife conservancy on the western edge of Laikipia plateau) with the **Mogwooni area** (adjoining sections of the wider Laikipia rangelands, including the edge of the Uaso Narok basin and forested slopes of the Aberdare Range). This gap functions as a **micro-corridor** that helps maintain local wildlife connectivity between the western Laikipia rangelands and higher elevation habitats movements between private ranches, community lands, and protected forest areas.
5. **Mukutan-Luoniek corridor** - is an important wildlife passage linking **Mukutan Gorge** (a dramatic escarpment area on the western edge of the Laikipia Plateau, within the

Laikipia Nature Conservancy / Ol Ari Nyiro) to the **Luoniek area** (wooded rangelands and escarpment lands extending towards Baringo and the Rift Valley floor) This corridor provides a critical **westward outlet** for wildlife moving from the Laikipia Plateau across the **Great Rift Valley escarpment** toward **Baringo lowlands** and beyond. It is one of the few remaining relatively open routes across Laikipia's western edge.

6. **Mugie –Luoniek-Mukutan Conservancy Corridor** in Luoniek location represents a model of collaborative conservation bridging private and communal lands. The corridor:

   » *Enables the seasonal movement of wide-ranging species such as elephants, lions, zebras, and reticulated giraffes across private conservancies and community lands. It helps maintain genetic diversity and supports climate-resilient migration patterns.*

   » *Link Between Rangeland and Forest: It links highland forests and water catchments (e.g., Mukutan Gorge and the edge of the Mau ecosystem) to open savannahs and dryland habitats, creating an ecological continuum.*

   » *Mitigates Habitat Fragmentation: The corridor counters the effects of land subdivision and fencing that threaten to isolate wildlife populations within fenced or converted ranches.*

The preservation of this corridor is essential not only for wildlife connectivity in northern Kenya but also for sustaining the ecological and economic fabric of Laikipia County. Strengthening governance, securing land tenure, and enhancing community participation are key to the corridor's future.

7. **The Mugie–Loisaba corridor** connects **Mugie Conservancy** (in northern Laikipia, a large private conservancy integrating wildlife and livestock) with **Loisaba Conservancy** (a major private conservancy that forms part of a north-south ecological axis linking Laikipia to Samburu and beyond).This corridor is essential for **north-south wildlife movement** between Laikipia's northern ranches and community conservancies linking Laikipia's private and community conservation landscapes into a larger functional ecosystem.
8. The **Nkoteiya–Kirisia corridor** is a vital ecological linkage in **Samburu County**, connecting **Nkoteiya** (a dryland community area near Westgate Conservancy and northern Laikipia) to the **Kirisia Forest** (a large montane forest block providing permanent water and refuge for wildlife).This corridor allows wildlife to move between **lowland savannahs** and **highland forest habitats** access dry-season resources in the forest and return to the plains during the wet season.
9. The **Ol Ngarua–Rumuruti corridor** is a west-central Laikipia wildlife linkage, connecting **Ol Ngarua** (a mixed-use area with livestock, agro-pastoralism, and remnant wildlife) to the **Rumuruti Forest** and adjoining landscapes, which act as a water catchment and refuge. This corridor is increasingly under pressure but was historically used by **Elephants** and other species moving between Laikipia Plateau and **western Rift Valley lowlands.**
10. The **Rumuruti–Mutara corridor** links **Rumuruti Forest / settlement zone** (Laikipia West — important as a water catchment and forest refuge) to **Mutara Conservancy and adjacent ranchlands** (northern extension of Laikipia's private conservancies network). This corridor historically enabled **Elephants** and other species to move between Laikipia Plateau's southern and northern sectors Seasonal dispersal between forested and open savannah zones.
11. The **Suguroi corridor** lies in northern Laikipia, connecting **Suguroi Ranch / area** (largely undeveloped, with open rangelands) with neighboring conservancies (e.g., **Loisaba, Mugie**) and communal grazing lands that form part of the broader **Laikipia–Samburu connectivity landscape.** This corridor functions as a **north-south passage** for large mammals between Laikipia's northern private lands and the community conservancies of the greater Samburu ecosystem.

Other key corridors mapped included:

Parcel LR No. 1091, Luoniek Location-From the ground trothing it was identified as a public reserved from Luoniek settlement as a wildlife corridor. The corridor is part of the broader Laikipia–Samburu–Isiolo rangeland system, linking: Laikipia Conservancies (e.g., Ol Jogi, Mpala, Loisaba), Community lands and group ranches in Mukogodo and Il Ngwesi, Samburu National Reserve and surrounding landscapes. The parcel also functions as a dry-season refuge and grazing passage and an important for gene flow and maintaining ecosystem connectivity between fragmented conservation lands.

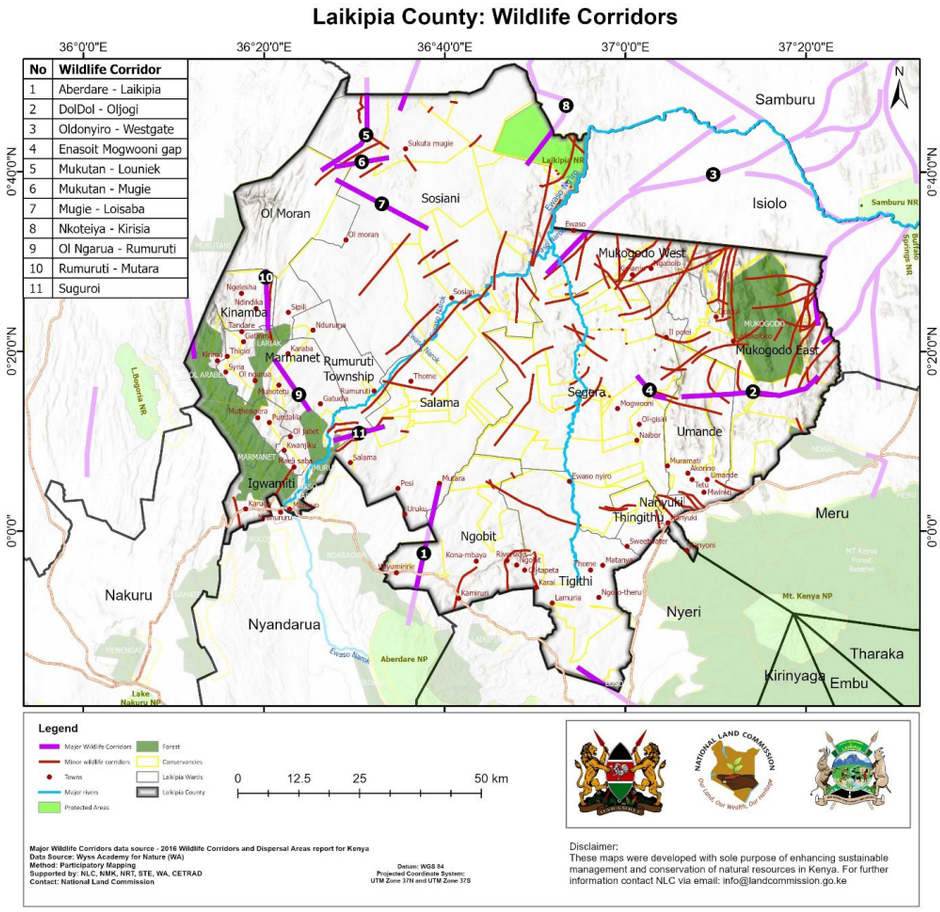


Figure 25: Major and Minor Wildlife Corridors in Laikipia County

3.9.3 Threats & Challenges

Laikipia County is globally recognized for its unique mosaic of private conservancies, community lands, forests, and rangelands that together support one of Kenya's richest wildlife assemblages outside formally protected areas. Central to this ecological integrity are wildlife corridors that allow free movement of species between critical habitats such as Mount Kenya, the Aberdares, Laikipia Plateau, Samburu, and the Rift Valley lowlands. However, these corridors face mounting threats and challenges, driven by complex social, economic, and environmental pressures including:

1. **Land subdivision and fragmentation**
    - Increasing **subdivision of large ranches**, group ranches, and communal lands into small parcels is rapidly closing down open migratory routes.
    - **Fencing** for agriculture, settlement boundaries, and property demarcation obstructs traditional wildlife pathways.
    - Land privatization has accelerated as group ranches dissolve and land tenure formalization spreads, especially in Ol Ngarua, Rumuruti, and parts of Mukutan–Luoniek.
2. **Expansion of human settlements and infrastructure**
    - Fast-growing **urban centers and peri-urban settlements** (e.g., Rumuruti, Doldol, Oldonyiro) are pushing into traditional dispersal zones.
    - **Road construction, powerlines, and other infrastructure** (without wildlife-friendly designs like underpasses) fragment habitats and increase wildlife mortality.
    - **Insecure land tenure** and weak land use planning have allowed unregulated development to spread across sensitive corridor zones.

3. **Agricultural expansion and habitat loss**
    - Rising demand for land for **crop farming and intensive livestock production** is leading to land conversion in corridor areas such as Mutara, Ol Ngarua, and the Aberdare-Laikipia interface.
    - Irrigated horticulture and settlement farming near forests and watercourses further degrade habitat quality.
4. **Overgrazing and rangeland degradation**
    - **Unplanned grazing** by large livestock herds, especially in communal areas (Nkoteiya-Kirisia, Oldonyiro-Westgate), reduces ground cover and depletes water sources vital for both wildlife and livestock.
    - In dry seasons, competition intensifies, exacerbating conflicts and reducing the ecological functionality of corridors.
5. **Charcoal burning, fuelwood collection, and deforestation**
    - **Kirisia Forest, Luoniek woodlands, Rumuruti Forest**, and other key wooded habitats within corridor zones are under pressure from unsustainable charcoal production and timber harvesting.
    - This reduces critical refuge and foraging habitat for wildlife and erodes ecosystem services for communities.
6. **Human-wildlife conflict**
    - As corridors close and wildlife movement is restricted, incidents of **crop raiding, livestock predation**, and **damage to property** have increased, leading to retaliatory killings or negative attitudes toward conservation.
    - Elephants, in particular, are vulnerable as they attempt to navigate increasingly fragmented landscapes.
7. **Insecurity and weak enforcement**
    - Cattle rustling, banditry, and occasional inter-community conflict along corridor zones (notably Mukutan-Luoniek, Nkoteiya-Kirisia, Oldonyiro-Westgate) disrupt wildlife movement and reduce conservation investment.
    - Weak institutional capacity to enforce land use plans or wildlife protection exacerbates these challenges.
8. **Climate change pressures**
    - Increasing drought frequency is intensifying resource competition and driving wildlife to seek water and pasture across fragmented landscapes, amplifying conflict risks.
    - Loss of functional corridors undermines species' ability to adapt to shifting ecological conditions.

The survival of Laikipia's corridors is at a tipping point. Without urgent, integrated interventions—combining land use planning, community engagement, private sector partnerships, and policy support—Laikipia risks losing the connectivity that sustains its iconic wildlife and underpins both ecological health and local livelihoods.

3.9.4 Opportunities

- **Wildlife breeding areas**—offer essential shelter and security for calving, nesting, and nursery activities. Opportunities exist to secure these areas through integration into conservancy plans and county spatial frameworks. Community stewardship can be enhanced by establishing breeding "quiet zones," especially in community and private lands where voluntary protection is possible. Habitat rehabilitation and eco-tourism development around key breeding hotspots (e.g., for elephants, antelopes, and birds) can generate conservation incentives and livelihoods.
- **Wildlife concentration areas**, such as salt licks, dry season water points, and nutrient-rich grazing zones, are focal points of wildlife activity but also areas of potential competition with livestock. Here, Laikipia can pioneer co-grazing models that enable seasonal sharing of

resources while minimizing conflict. Payment for Ecosystem Services (PES) schemes, including wildlife leases and tourism-linked benefit sharing, offer viable pathways to reward landowners and communities for conservation. Concentration areas can also serve as hubs for wildlife tourism, enhancing revenue while maintaining ecological function.

- **Wildlife corridors,** critical for migratory species like elephants, giraffes, and zebras, face the highest threats due to fencing, settlement, and agricultural expansion. However, Laikipia's strong conservancy movement, community willingness, and expansive private lands create unique opportunities to secure functional corridors. These include corridor mapping and gazettement, conservation easements, and negotiated access agreements with landowners. Integrating corridors into county spatial and infrastructure planning can help prevent fragmentation. Furthermore, corridor protection aligns with national wildlife strategies and opens doors to climate finance and donor-supported conservation investments.

Across all three areas, there is a shared opportunity to build on Laikipia's existing collaborative governance structures—particularly the network of community conservancies, wildlife associations, and water resource user groups. Strengthening these partnerships can promote integrated land management, enhance resilience to climate variability, and support the coexistence of people, livestock, and wildlife. Key opportunities are summarised in Table 17.

Table 17: Opportunities for Wildlife Resources in Laikipia County

Opportunity	Potential Benefits / Description
Strengthening community conservancies and partnerships	Wildlife corridors and dispersal areas can be secured and managed through expansion of community conservancies and public-private-community partnerships, enhancing both conservation and local livelihoods.
Landscape-level land use planning	Integration of corridors and concentration areas into the County Spatial Plan, rangeland management plans, and conservancy plans offers a pathway for securing connectivity and preventing habitat fragmentation.
Payment for ecosystem services (PES)	Wildlife corridors and dispersal areas provide opportunities for PES schemes (e.g. carbon, tourism revenue sharing, wildlife lease programs) that incentivize conservation on private and community land.
Eco-tourism development	Concentration areas and corridors can be leveraged for tourism investments (e.g. wildlife viewing, photographic safaris), creating alternative income sources for landowners and communities.
Climate resilience and ecosystem services	Protecting and restoring corridors enhances ecosystem services (e.g. pollination, water regulation), supporting broader climate change adaptation for both people and nature.
Conflict reduction through zoning and co-management	Clear designation and management of corridors and dispersal areas can reduce human-wildlife conflicts, particularly where wildlife movement overlaps with agriculture or settlement.
Access to conservation finance	Well-defined wildlife areas aligned with national and county priorities can attract external funding (e.g. GEF, Adaptation Fund, private conservation investors) for habitat protection and restoration.
Strengthening legal protection	Formal recognition of key corridors and dispersal zones through county or national legislation can secure their status and ensure long-term conservation.

3.10 Livestock Resources

Laikipia County's rangelands are a key livelihood resource for pastoral and agro-pastoral communities, supporting large herds of cattle, sheep, goats, camels, and wildlife. The county's livestock production system relies heavily on seasonal movements along grazing routes and access to dry season grazing areas to cope with the region's climatic variability. During dry seasons, animals move to areas with permanent water sources like rivers, and areas with browse (acacias, commiphoras, etc.) are favored. Forest areas are known for their browse availability, making it an attractive grazing area for livestock during dry periods (Figure 26).

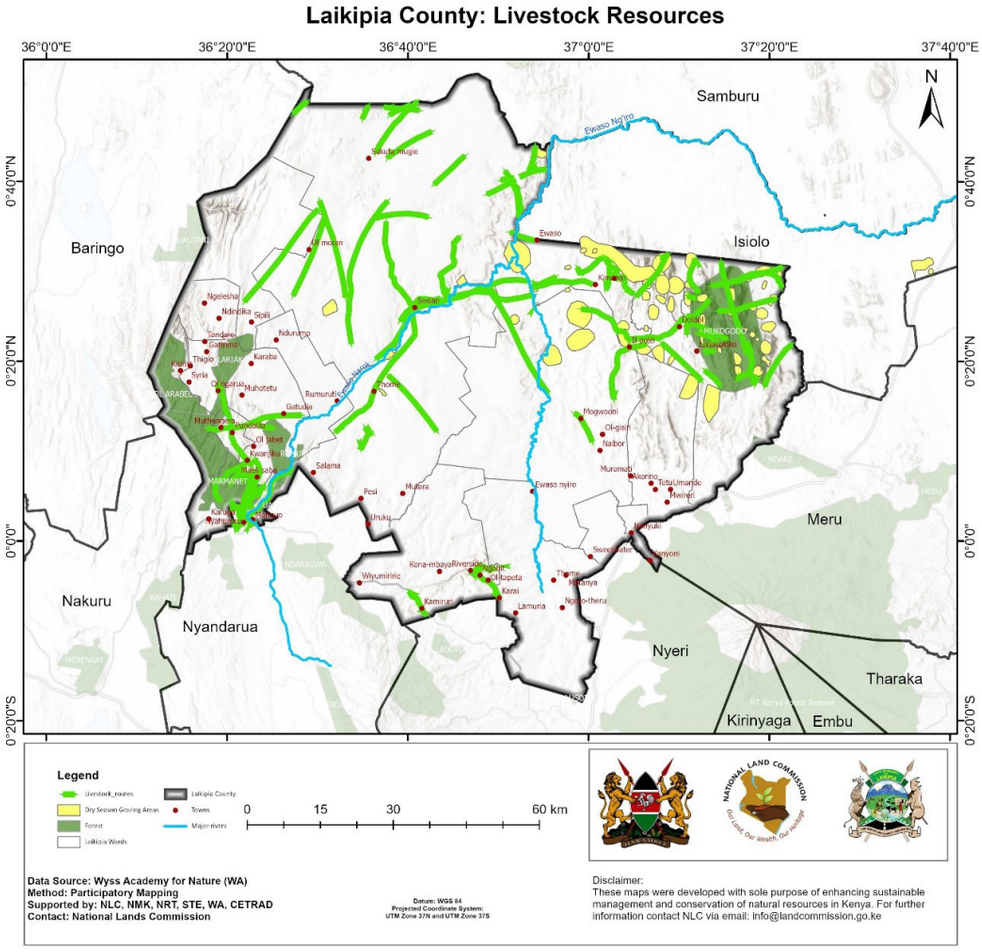


Figure 26: Livestock grazing routes and dry season grazing areas in Laikipia County.

3.10.1 Livestock Dry Season Grazing Areas

From the mapping initiative, a total of 56,041 ha of dry season grazing areas were mapped in Laikipia County (Figure 27). Dry season areas largely standout in Ol Moran areas and the Mugokodo forest. These areas are key dry season grazing zones as they accumulate grass and vegetation during wet seasons (Figure 28).

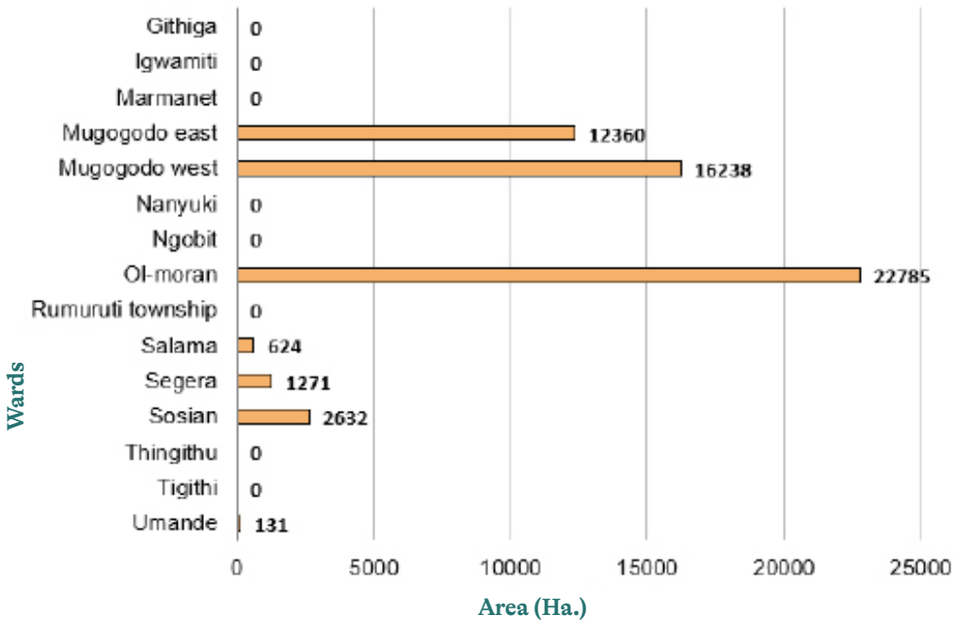


Figure 27: Estimated area (ha) of livestock corridors Dry Season Grazing Areas

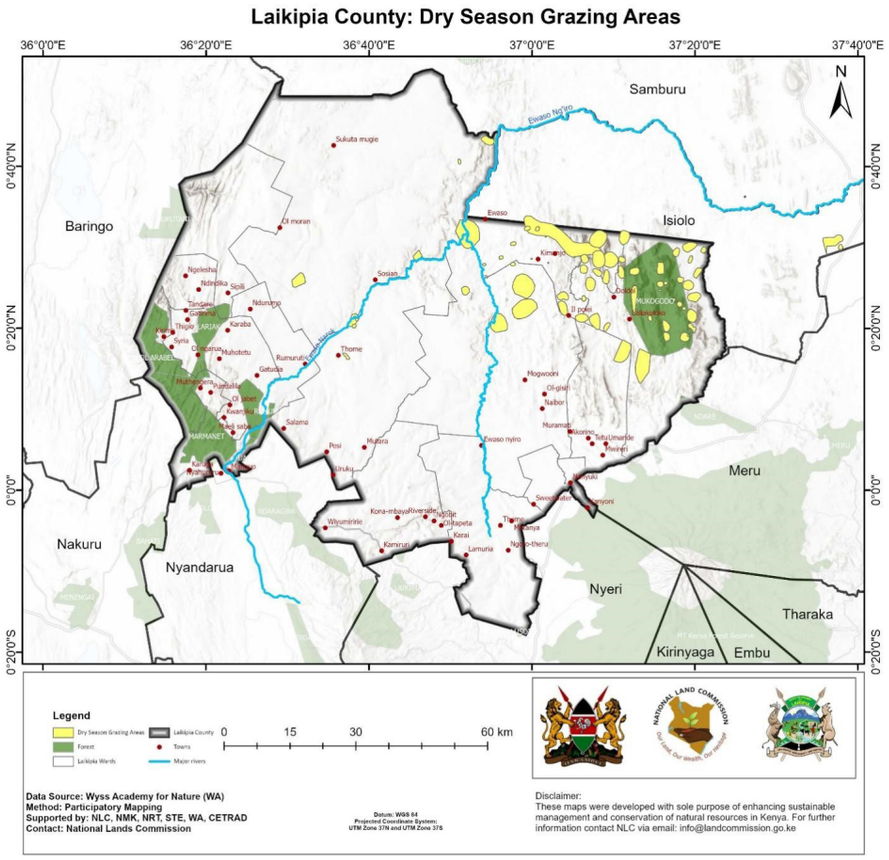


Figure 28: Livestock dry season grazing areas in Laikipia County.

3.10.2 Livestock Routes

The seasonal mobility of own livestock, mostly cattle, sheep, goats and camels, is an inherent way to pastoralists - they move their animals in search of water and pasture when there are no longer available in their inhabited areas. From the mapping initiative, a total of 926.81 km of livestock routes were mapped in Laikipia County as presented in Figure 29. The spatial distribution of livestock routes are largely around forest ecosystems in the county (Figure 30).

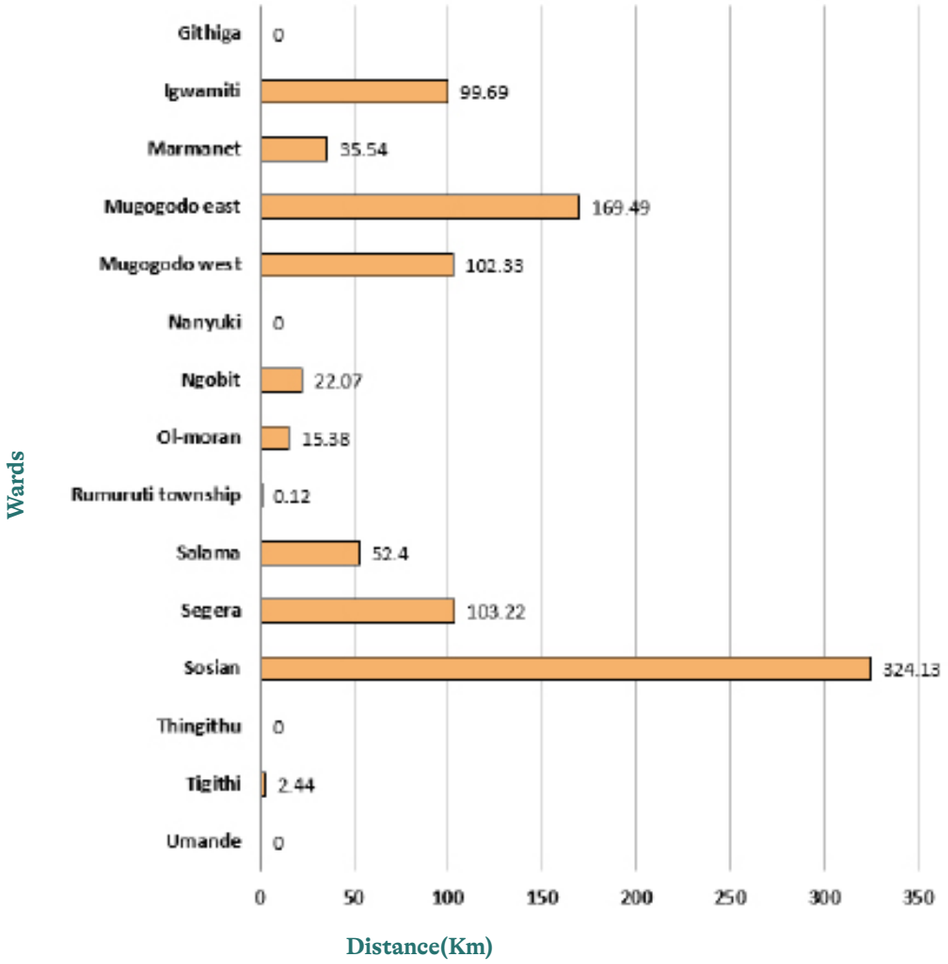


Figure 29: Estimated distance (km) of livestock corridors

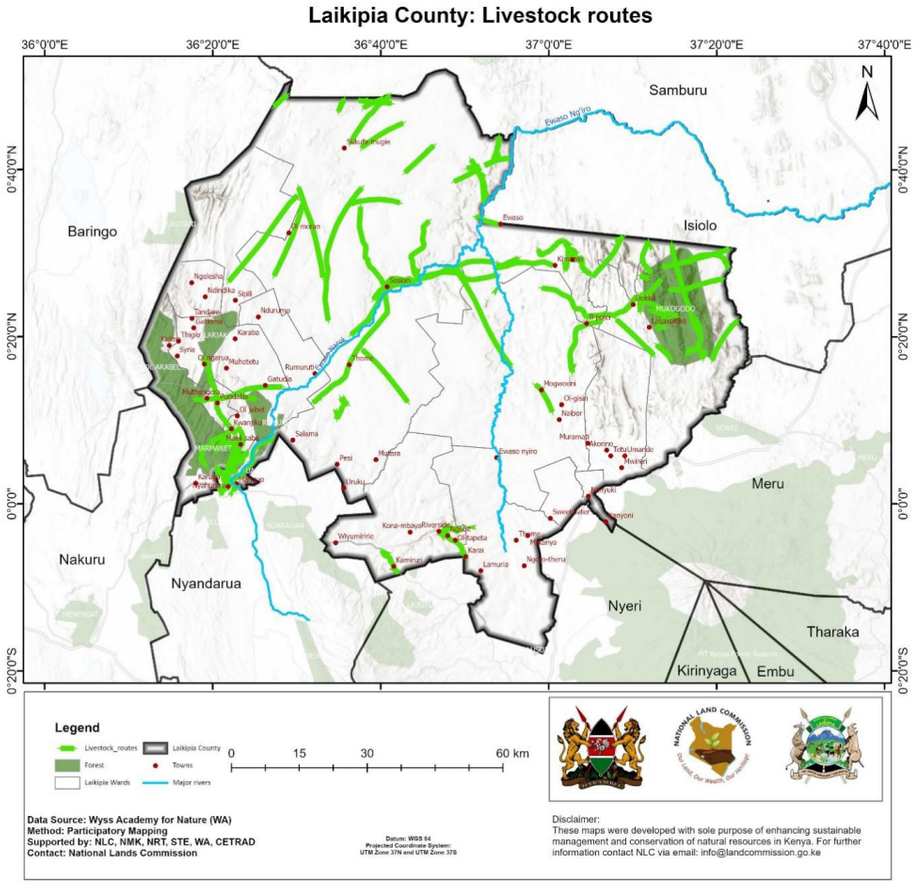


Figure 30: Surveyed Spatial Distribution of Livestock routes in Laikipia County.

3.10.3 Threats and Challenges

- Overgrazing, particularly in areas like Mukogodo West, that have been degraded thus limiting pasture availability.
- Long distances between watering points and water scarcity during dry periods can lead to weight loss in livestock.
- Climate change and prolonged severe drought resulting in loss of livestock, reduced pasture quality and quantity, potentially leading to lower livestock productivity and increased vulnerability of pastoral communities.
- Invasive species: Opuntia stricta and Dracaenas stuckyi are invasive species spreading across Laikipia North, adversely affecting the available graze lands and livestock health.
- Human-Wildlife Conflict (HWC), and elephants, in particular, pose a threat to livestock through depredation and the potential for dangerous encounters. Conflicts arise due to competition for resources, including grazing land, and the perception of wildlife as a threat to livestock. These conflicts has led to livestock losses and increased vulnerability of herders and their families.
- Resource Conflicts and Invasions in particular, conflicts have arisen between herders and ranchers over access to grazing land, predominantly during drought periods. Herders may perceive land owned by ranchers as underutilized and engage in land invasions. These conflicts can escalate into violence and jeopardize the livelihoods of both herders and ranchers.
- Land use changes, particularly increased settlement, land subdivision, and development of infrastructure, has significantly impact livestock routes by reducing grazing areas, disrupting traditional water sources, and increasing competition for resources, which can lead to conflict between different land users.

3.10.4 Opportunities

Laikipia's rangeland system, built on mobility and seasonal grazing patterns, presents major opportunities for strengthening resilience, livelihoods, and ecosystem health if dry season grazing areas and routes are secured and well-managed as presented in Table 18.

Table 18: Opportunities for Livestock Resources in Laikipia County

Opportunity	Potential Benefit / Description
Integration into County Spatial Planning	Formal mapping and recognition of livestock routes and dry season grazing reserves in the County Spatial Plan and Rangeland Management Plans can protect these critical areas from encroachment and fragmentation.
Strengthening customary and community governance	Revitalizing and supporting traditional grazing committees, community conservancies, and grazing associations can improve coordination, reduce conflict, and enhance sustainable use of dry season reserves.
Public-private-community partnerships	Collaborative agreements between private ranches, conservancies, and communities can enable negotiated access to key dry season grazing areas during droughts, building social cohesion and adaptive capacity.
Landscape-level rangeland restoration	Dry season grazing areas can serve as focal points for rangeland rehabilitation (e.g. reseeding, erosion control, bush management) to restore productivity and ecosystem services.
Livestock mobility as climate adaptation	Protecting and improving livestock routes and seasonal grazing access supports herd mobility — a proven climate resilience strategy in arid and semi-arid areas.
Access to climate adaptation and rangeland funding	Programs that secure grazing routes and reserves align with national and international priorities (e.g. drought resilience, ecosystem-based adaptation), opening funding opportunities (e.g. GEF, GCF, ASAL programs).
Conflict mitigation and peace building	Clear and managed routes and reserves reduce resource-based conflicts among communities, between communities and private landowners, and between livestock and wildlife.
Linking to wildlife coexistence strategies	Livestock routes and dry season grazing areas overlap with wildlife corridors; integrated management can promote coexistence and reduce competition during critical periods.

3.11 Island of Dense Vegetation

Dense vegetation islands, or areas of relatively high vegetation compared to their surroundings, can be found in drylands (Plate 16-17). These islands are often shaped by factors like microclimate, soil characteristics, or water availability, and can support unique plant communities. A total of 53,647 ha of island of dense vegetation was recorded as in Fig. 31 and 32.

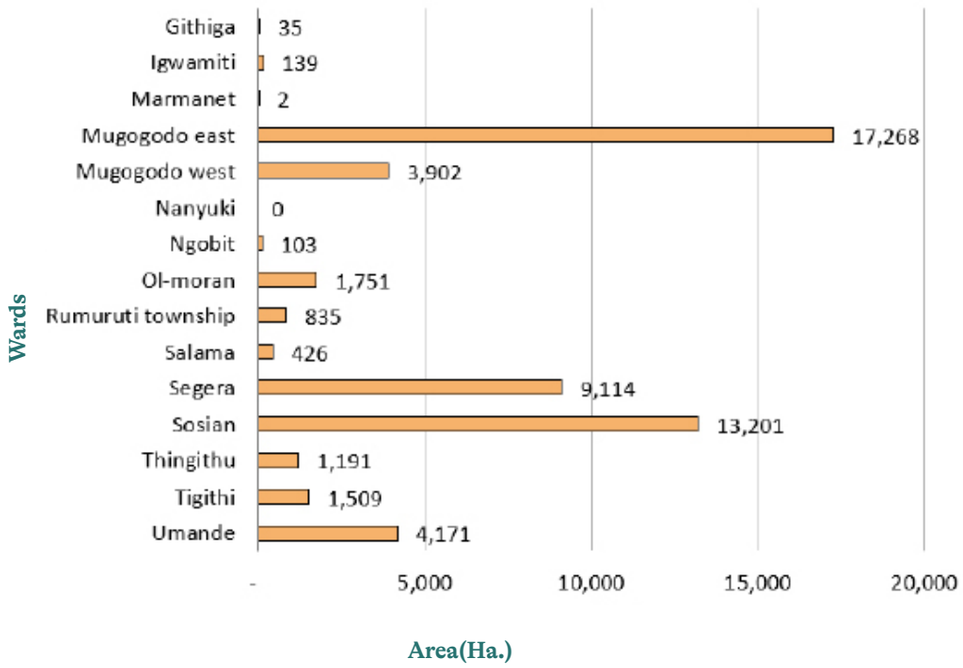
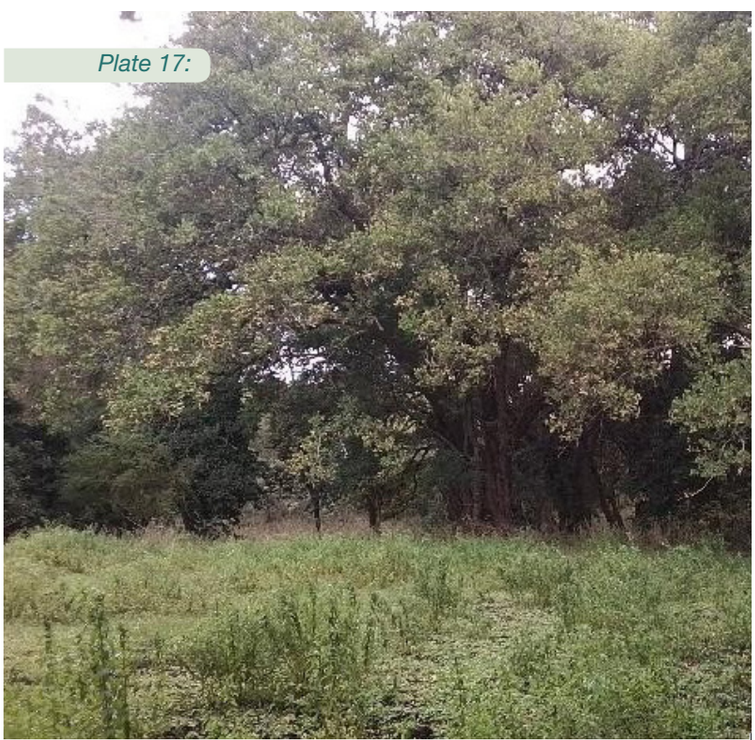


Figure 31: Estimated area (ha) of dense vegetation islands in Laikipia County

Plate 16: Bahati Mbaya Island of Dense Vegetation in Olmoran location
Plate 17: Paradise Island of dense vegetation, Ethi south location



Dense vegetation islands in drylands areas such as Laikipia play a vital role in regulating ecosystem processes, including water availability, nutrient cycling, and soil erosion control. They act as havens for biodiversity and can enhance ecosystem resilience to stressors like drought and nutrient limitations. The spatial arrangement of vegetation, including patch distribution, significantly influences processes like water infiltration and runoff.

Spatially, Laikipia's landscape features dense vegetation islands, particularly during the rainy season. These areas are lush and green, offering a stark contrast to the drier, more open plains. They are crucial for wildlife, providing habitats and water sources. The presence of these island of dense vegetation are largely found in Mukogodo East noted for its scenic beauty and wildlife (Fig. 29).

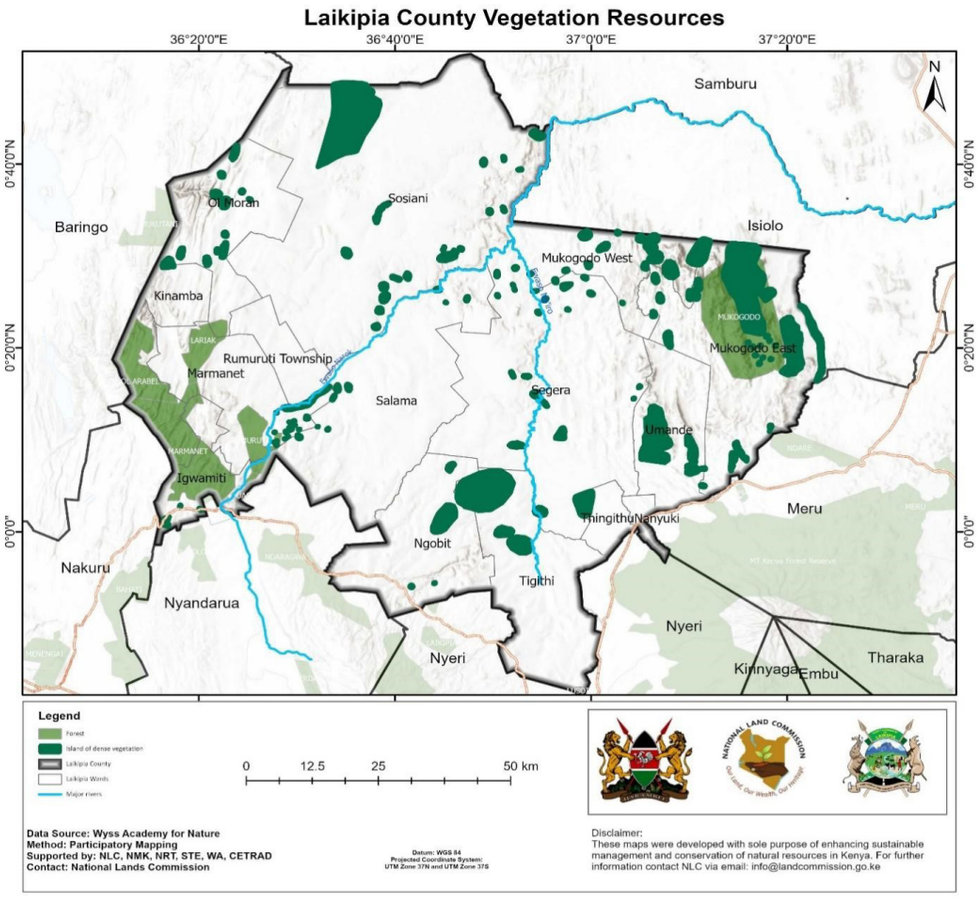


Figure 32: Spatial Distribution of Island of Dense Vegetation in Laikipia County

3.11.1 Tenure

The mapping findings shows Private tenure dominates (57 sites, ~50%), indicating that many of these islands of dense vegetation are on private ranches, conservancies, or farms. This presents both a conservation opportunity (where private stewardship is strong) and a risk (where land conversion is occurring). Community tenure (31 sites, ~27%) highlights the importance of communal management, particularly in rangeland and conservancy settings where such vegetation provides critical dry season forage, habitat, and ecosystem services.

Public tenure (19 sites, ~17%) likely includes forest reserves, riparian zones, and other government lands — often areas with weak protection and high vulnerability to encroachment (Table 19). The diverse tenure structure offers opportunities for collaborative management, but also calls for targeted strategies:

- **Private lands:** Promote stewardship incentives, PES schemes, and integration into conservation-compatible land use plans.
- **Community lands:** Strengthen governance structures, grazing plans, and restoration programs.
- **Public lands:** Prioritize protection through enforcement, co-management, and restoration initiatives.

Table 19: Island of dense vegetation Tenure in Laikipia County

Tenure Type	Number of Sites	% of Total
Community	31	~27%
Public	19	~17%
Private	57	~50%
Grand Total	107	100%

3.11.2 Management

Similarly, **Private management dominates (54 sites)** — indicating the key role of private landholders (e.g. ranches, conservancies) in the stewardship or exploitation of these important vegetation islands. **Community and conservancy-linked management (including hybrid forms**) covers at least 25 sites, showing active community participation in protecting and using these natural assets. **Kenya Forest Service (alone or in combination) is involved in at least 15 sites**, typically on forest reserves or associated public lands. Lastly, unmanaged sites (6) present a risk of degradation due to lack of oversight or protection (Table 20). In summary, the management of islands of dense vegetation in Laikipia reflects a diverse mix of private, community, and public governance. Opportunities exist to enhance collaboration, improve protection of unmanaged sites, and integrate these areas into broader conservation and land use strategies.

Table 20: Island of dense vegetation Management in Laikipia County

Management Type	Number of Sites
Community	5
Community Conservancy	18
Community Conservancy + Forest Resource Association + KFS	1
Community Conservancy + KFS + Forest Resource Association	1
Community Water Project	3
Forest Resource Association + Community Conservancy + KFS	1
Forest Resource Association + KFS	1
Kenya Forest Service (KFS)	12
KFS + Forest Resource Association	1
Kenya Wildlife Service (KWS)	2
Private Management	54
Private Management + KWS	1
Public (unspecified agency)	1
None (Unmanaged)	6

3.11.3 Threats and Challenges

Dense vegetation islands in Laikipia County face various threats, primarily stemming from human activities and climate change impacts. These include deforestation, habitat loss, and the spread of invasive species, all of which negatively affect wildlife, local livelihoods, and the overall ecosystem. The specific threats and challenges mapped include:

- Illegal logging, charcoal production, and intense grazing pressures contribute to deforestation, directly impacting forest regeneration and biodiversity. This also affects watershed functions, especially critical in water-stressed Laikipia, potentially leading to broader environmental consequences.
- Invasive Species: Exotic plant species introduced to the region have escaped cultivation and pose a threat to native biodiversity.
- Extreme weather events like droughts, floods, and wildfires, exacerbated by climate change, further disrupt ecosystems and threaten vegetation. Soil erosion, prolonged droughts, and the emergence of invasive species, particularly in the northern part of the county, are also significant impacts.
- Human-Wildlife Conflict: Conflicts over resources like water and pasture, between humans and wildlife, can lead to habitat fragmentation and further degrade vegetation.
- Land Use Change: Conversion of land for agriculture or settlement can fragment habitats, reduce connectivity between vegetation islands, and disrupt wildlife movement.
- Barriers to Wildlife Movement: Human-induced barriers like fences, even those intended to address human-wildlife conflict, can limit wildlife movement and further isolate vegetation islands.
- Lack of Unity among Stakeholders: A lack of coordination and cooperation among different stakeholders, including local communities, conservation organizations, and government agencies, can hinder effective management of Laikipia's natural resources.

3.11.4 Opportunities

Dense vegetation islands in Laikipia County present diverse opportunities, including tourism, biodiversity conservation, and potential resource management. These islands act as vital habitats for various wildlife species, contribute to the county's scenic beauty, and offer opportunities for tourism and research. The breakdown of these opportunities are as follows:

- Wildlife Viewing: Dense vegetation areas, especially those bordering protected areas, attract tourists seeking to spot wildlife like elephants, giraffes, and various bird species.
- Scenic Beauty: The lush landscapes offer opportunities for photography, hiking, and other outdoor activities, boosting tourism revenue.
- Conservation Tourism: Conservation efforts in these areas, such as ranches and conservancies, attract tourists interested in learning about sustainable land management and wildlife conservation.
- Habitat for Wildlife: Dense vegetation islands provide essential habitats for diverse species, contributing to the county's rich biodiversity.
- Water Source and Water Regulation: Riparian vegetation (vegetation along rivers and streams) plays a crucial role in water infiltration and regulating water flow.
- Carbon Sequestration: Dense vegetation acts as a carbon sink, helping to mitigate climate change.
- Soil Erosion Control: Vegetation helps stabilize soil, preventing erosion and protecting agricultural lands.
- Rangelands and Pasture: Dense vegetation in some areas, particularly in group ranches, provides grazing land for livestock.
- Traditional Knowledge and Practices: Local communities, especially pastoralists, possess valuable indigenous knowledge about land management and sustainable grazing practices.
- Agroforestry and Agro-Ecotourism: Dense vegetation areas can support agroforestry practices, integrating trees into agricultural systems, and potentially offer opportunities for agro-ecotourism.
- Biodiversity Studies: Dense vegetation islands provide excellent locations for studying plant and animal biodiversity, especially in areas with unique or endangered species.
- Land Use and Vegetation Dynamics: Researchers can monitor changes in land cover and vegetation patterns over time, helping to assess the impact of conservation efforts and climate change.

3.12 Natural Saltlicks Areas

Natural salt lick areas are locations where animals — both **livestock** and **wildlife** — naturally congregate to obtain essential minerals, particularly **salt**, that are crucial for their health and well-being (**Plate 18–19**). These salt licks play a vital role in dryland ecosystems by providing key biometals such as **sodium, calcium, iron, zinc, phosphorus**, and other trace elements necessary for **bone and muscle development, reproductive health, and overall growth**.

Salt licks are especially important in supporting the nutritional needs of animals in Laikipia's rangelands, where natural mineral availability in forage and water may be limited. By supplying these essential minerals, salt lick areas contribute to **healthy livestock production, wildlife population health**, and **the sustainability of pastoral and wildlife-based livelihoods.**

These areas can be natural formations where salt deposits are found or areas where salt has been introduced artificially. Salt licks are often found in or near water sources and can be important gathering places for wildlife. A total of 165 salt licks areas were recorded in Laikipia County as presented in Table 10.

The highest concentration of salt licks occurs in the Mukogodo East (35), Mukogodo West (31), and Sosian (28) wards — areas critical for both livestock and wildlife nutrition, especially during the dry season. Segera (15), Marmanet (12), and Ngobit (11) also have notable numbers of salt licks, supporting both domestic and wild herbivores. Several wards (e.g., Githiga, Ol-moran, Thingithu) have no mapped salt licks, possibly due to land use patterns (e.g., agriculture, urbanization) or geological factors (Fig. 21).

Plate 18: Gumba salt lick, Mwituria location, Laikipia county
Plate 19: Langata ndandapo Salt lick, Ilmotiok location

Table 21: Surveyed Salt licks in Laikipia County

165

Natural Saltlicks Areas

Wards	Salt Lick
Githiga	0
Igwamiti	6
Marmanet	12
Mukogodo East	35
Mukogodo West	31
Nanyuki	1
Ngobit	11
Ol-moran	0
Rumuruti Township	2
Salama	10
Segera	15
Sosian	28
Thingithu	0
Tigithi	5
Umande	8

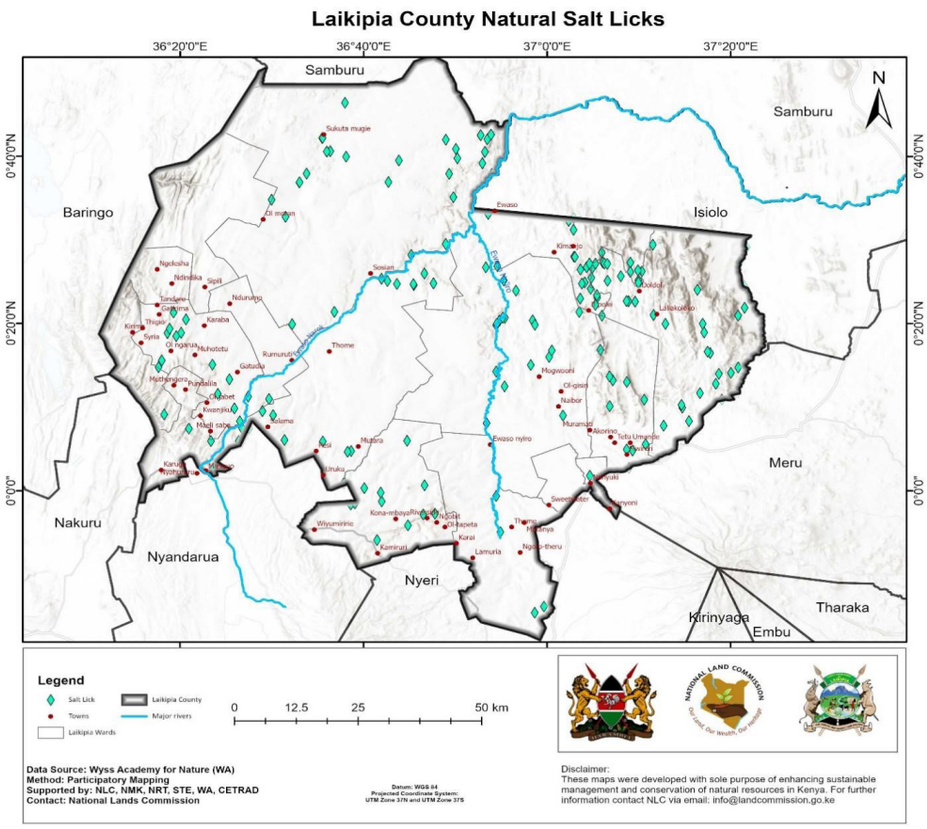


Figure 33: Surveyed Salt Lick areas in Laikipia

3.12.1 Uses & Importance

In the County, salt licks are vital natural assets that:

- Provide essential minerals to livestock and wildlife, supporting health and productivity.
- Influence **livestock and wildlife movement patterns,** often serving as focal points for grazing and watering routes.
- Can become **conflict hotspots** if not well managed, especially where access is contested between wildlife, livestock, and human activities.

3.12.2 Management

Salt lick management in Laikipia is diverse, with a mix of private, community, and public sector involvement. Strengthening coordination, securing unmanaged sites, and integrating salt lick management into land use plans will be critical for sustaining these vital resources. Private management (56 salt licks) represents the largest share, highlighting the critical role of private landowners (e.g. ranches, conservancies) in salt lick stewardship. Community-based management (e.g. Community Conservancy, Community Water Project) covers a significant portion (about 64 sites combined), emphasizing local institutions' contribution to salt lick protection and access governance. Unmanaged salt licks (29) pose a risk of degradation, overuse, and conflict, especially during dry seasons when livestock and wildlife congregate at these points. Lastly joint management arrangements (e.g. Community Conservancy + KFS, KFS + KWS + Private) offer opportunities for collaborative conservation, though they may require stronger coordination.

3.12.3 Threats and Challenges

Salt licks in Laikipia play a vital role in sustaining wildlife and livestock health, especially in the dry season. However, they face multiple pressures that undermine their ecological and economic value as presented in Table 22.

Table 22: Threats to Salt licks in Laikipia County

Threat / Challenge	Description / Impact
Encroachment and land use change	Expansion of cultivation, settlement, and fencing blocks access to traditional salt lick sites, fragmenting grazing and wildlife movement patterns.
Overuse and degradation	High concentrations of livestock and wildlife at salt licks during droughts lead to soil erosion, trampling, vegetation loss, and reduced site quality.
Weak or absent management	Unmanaged salt licks (e.g. the 29 unmapped to any structure) are prone to degradation, unregulated access, and conflict between users.
Competition and conflict	Salt licks can become hotspots for conflict, particularly where livestock and wildlife converge or where access is contested between private, community, and public interests.
Climate variability	Increased drought frequency intensifies pressure on salt licks, reducing recovery periods and accelerating degradation.
Vandalism and uncontrolled access	Salt licks located near settlements or roads may suffer from vandalism, dumping, or unregulated use, especially where fencing or oversight is weak.
Limited rehabilitation efforts	Few programs exist to restore degraded salt licks, resulting in gradual loss of function and value over time.

3.12.4 Opportunities

Salt licks are critical natural assets for both wildlife and livestock in Laikipia. They offer a range of opportunities to strengthen rangeland management, biodiversity conservation, and livelihoods if well protected and integrated into broader land use frameworks (Table 23).

Table 23: Threats to Salt licks in Laikipia County

Opportunity	Potential Benefits / Description
Integration into land use and grazing plans	Mapping and formalizing salt lick locations in county spatial plans, rangeland management plans, and conservancy grazing plans can protect these vital sites from encroachment and degradation.
Strengthening community governance	Salt licks managed by community conservancies, WRUAs, or grazing committees can enhance collective action, reduce conflicts, and promote equitable access during droughts.
Public-private partnerships (PPP)	Joint management between private landowners, community groups, and government agencies can ensure shared responsibility for salt lick protection while balancing commercial. livestock and wildlife needs.
Eco-tourism and conservation linkages	Well-managed salt licks can support wildlife tourism and photographic safaris, generating income for landowners and communities, particularly in conservancies and ranches e.g. Sarova Salt Lick Game Lodge
Climate adaptation financing	Salt lick protection aligns with climate resilience goals, offering potential for support through climate adaptation funds and ecosystem-based adaptation programs.
Rehabilitation of degraded salt licks	Targeted rehabilitation (e.g. fencing, erosion control, controlled access points) can restore degraded salt licks, enhancing ecosystem services and livestock/wildlife health.
Research and monitoring	Salt licks offer opportunities for collaborative research (e.g. on wildlife-livestock interactions, mineral availability, land degradation), helping inform better management.

In summary, Laikipia's salt licks provide an opportunity to strengthen natural resource governance, improve rangeland health, and support coexistence between wildlife and livestock — if management is improved and sites are integrated into landscape-level plans.

4. LEGAL FRAMEWORKS FOR DRYLAND NATURAL ASSETS IN KENYA

4.1 Overview

Kenya's legal frameworks for dryland natural assets focuses on sustainable management and community participation, recognizing that drylands are vital for livelihoods and biodiversity. This framework includes national policies, integrated land use planning, and the recognition of collective land rights. This section provides the applicable legal frameworks for the protection and conservation of dryland natural assets in Kenya.

4.2 Applicable Legal Frameworks for the Protection and Conservation of Dryland Natural Assets

Kenya's legal framework for protecting and conserving dryland natural assets are all anchored in the Constitution of Kenya, 2010, which mandates environmental protection and sustainable resource management. Table 11 summarises these laws including their specific provisions and relevance to this mapping exercise initiative.

Table 24: Applicable Legal Frameworks for the Protection and Conservation of Dryland Natural Assets

Legal Framework	Article	% of Total (57)	Key Implications
Constitution	1	Sovereignty of the people.	Land and natural resources belong to Kenyans. Need for their involvement in their utilization and conservation.
	2 (5) and (6)	General rules of international law, treaties or convention ratified by Kenya form part of Kenya's laws.	There are many Multi lateral Environment (MEAs) related to natural resources including those in the drylands that requires sustainable use, conservation and development
	10	Principles of governance including democracy, rule of law, public participation	Provides anchorage on peoples participation in democtratic esource governance. Need for their involvement in their utilization and conservation.
	35	Access to information.	Citizen are informed by facts data on their natural resources and why their involvement in their meaningful participation, conservation and governance.
1. Constitution of Kenya, 2010	40	Protection of right to property	Guarantees the right of individuals to acquire and own property, either individually or in association with others.
	42	Right to a clean and healthy environment	Right to have the environment protected for present and future generations. Natural assets are also environmental resources
	60 (1)	Principles of land policy.	Land in Kenya shall be held, used and managed in a manner that is equitable, efficient, productive and sustainable. Sound conservation and protection of ecologically sensitive areas including dryland assets.
	61	Classification of land.	All land in Kenya belongs to the people of Kenya collectively as a nation, as communities and as individuals. Land in Kenya is classified as public, community or private. Natural assets occupy all the three land categories.
	67	National Land Commission mandate	The Commission role to: manage public land including dryland resources on behalf of the national and county governments; recommend a national land policy to the national government and to conduct research related to land and the use of natural resources, and make recommendations to appropriate authorities;

	69	Obligations in respect of the environment	The state to ensure sustainable exploitation, utilisation, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits; encourage public participation in the management, protection and conservation of the environment and to utilize the environment and natural resources for the benefit of the people of Kenya.
	70	Enforcement of environmental rights.	Protection of the right to lean and healthy environment recognised and protected under Article 42 if it has been, is being or is likely to be, denied, violated, infringed or threatened.
	71	Agreements relating to natural resource.	Parliament role in the grant of a right or concession by or on behalf of any person, including the national government, to another person for the exploitation of any natural resource of Kenya
	186	Respective functions and powers of national and county governments.	Role of the national government in natural resource management.
	260	Definition of land	"land" includes— (a) the surface of the earth and the subsurface rock; (b) any body of water on or under the surface; (c) marine waters in the territorial sea and exclusive economic zone; (d) natural resources completely contained on or under the surface; and (e) the air space above the surface;
2. Wildlife Conservation and Management Act, 2013	31 (1)	Declaration of protected areas	The CS by notice in the gazette can publish areas zoned to have wildlife conservation and management as their land use priority:
	33 (1)	Conservation and management of wetlands	The CS on recommendation of the KWS, in consultation with the National Land Commission, by notice in the Gazette can declare a wetland that is an important habitat or ecosystem for wildlife conservation a protected wetland.
	39	Establishment of conservancy or sanctuary.	Any person or community who own land on which wildlife inhabits may individually or collectively establish a wildlife conservancy or sanctuary.

	46	Protection of endangered and threatened ecosystems.	The CS may, on the advice of the Service and in consultation with the National Land Commission, by notice in the Gazette, publish a national list of wildlife ecosystems and habitats that are endangered and threatened and are in need of protection.
	74	Migration of wildlife.	Landowners requirement to facilitate the ease of movement of wildlife from one area to the other considering their migratory nature that attaches to the resource.
3. Land Act, 2012	8	Unbundles the role of the Commission in public land management	In the management of public land, NLC: • shall identify public land, prepare and keep a database of all public land, which shall be geo-referenced and authenticated by the statutory body responsible for survey • shall evaluate all parcels of public land based on land resources mapping and overall potential for use. • shall share data with the public and relevant institutions in order to discharge their respective functions and powers under this Act; • may require the land to be used for specified purposes and subject to such conditions, covenants, encumbrances or reservations as are specified in the relevant order or other instrument.
	15 (1)	Unbundles the role of the Commission in natural resource protection through reservations	(1) Subject to Article 66 (1) of the Constitution, the Commission may, in consultation with the national government and the county governments, by order in the gazette, reserve public land located within **(d) natural resources completely contained on or under the surface;** for one or more purposes in the public interest.
	15 (3)	Commission jurisdiction in undertaking an inventory of all land based natural resources.	Dry land assets constitute land based natural resources that must be mapped and inventoried by NLC
	16 (1)	Commission jurisdiction in placing of care, control and management of reserved public land.	Commission's role to vest the care, control, conditions and management of any reserved dryland assets with a statutory body, public corporation or a public agency.

4. The Physical and Land Use Act, 219	29(1)	Inter County Planning	Two or more Counties may, by mutual agreement or out of compelling necessity, formulate an inter-county physical and land use development plan for KOM resources. Natural resources are mostly transboundary in nature.
	37	Objects of County Spatial Planning	A county physical and land use development plan seeks to among others (a) to provide an overall physical and land use development framework for the county; (d) to guide the use and management of natural resources and to (e) to enhance environmental protection and conservation;
	52	Declaration of a Special Planning area.	An area that has unique development, natural resource, environmental potential or challenges can be declared as a special planning area.
	56	Power to undertake development control	County role to (b) control or prohibit the subdivision of land; and to (f) reserve and maintain all the land planned for open spaces, parks, urban forests and green belts in accordance with the approved physical and land use development plans.
The Physical And Land Use Planning Development Permission And Control) (General) Regulations, 2021	Part V—Easements, Wayleaves And Riparian Reserves Reg. 14	Measurement of the extent of riparian reserves.	Establishes the standards for riparian reserves
5. Water Act, 2016	5	Ownership of water resources.	Every water resource is vested in and held by the national government in trust for the people of Kenya.
	11	Water Resources Authority (WRA)	Establishes WRA an agent of the National Government responsible for regulating the management and use of water resources. Water resources are
	22	Protection of catchment areas.	WRA role to conserve a vulnerable water resource including catchment areas to be a protected area.

6. Environmental Management and Coordination Act (EMCA), 1999	3	Entitlement to a clean and healthy environment	Every person in Kenya is entitled to a clean and healthy environment and has the duty to safeguard and enhance the environment including natural resources
	7	Establishment of the National Environment Management Authority (NEMA)	NEMA role (b) take stock of the natural resources in Kenya and their utilisation and conservation;
	42	42. Protection of rivers, lakes and wet lands	The CS to provide for the development of an overall environmental management plan for a lake, river, wetland or coastal area, taking into account the relevant sectoral interest;
	43	Protection of traditional interests	The role to declare the traditional interests of local communities customarily resident within or around a lake shore, wetland, coastal zone or river bank or forest to be protected interests.
	50	Conservation of biological diversity	NEMA to ensure the conservation of biological diversity in Kenya including dryland assets.
	54	Protection of environmentally significant areas	The CS role to declare any area of land, sea, lake or river to be a protected natural environment for the purpose of promoting and preserving specific ecological processes, natural environment systems, natural beauty or species of indigenous wildlife or the preservation of biological diversity in general.
	58	Environmental Impact Assessment	EIA as a crucial tool crucial for protecting dryland assets as it evaluates the environmental, social, and economic impacts of projects, including those that might affect drylands.
	68	Environmental audit	Dryland assets, including land, water resources, and biodiversity, are particularly vulnerable to environmental degradation, making environmental audits crucial for sustainable development.

4.3 Legal Critique of the Applicable Frameworks in Relation to the Mapping

4.3.1 Fragmented Mandates and Overlapping Jurisdictions

Although Kenya's constitutional architecture anchors sustainable land use, environmental protection, and public trusteeship of key natural resources, the mapping exercise demonstrated that institutional mandates remain fragmented and operational responsibilities diffuse, particularly for water-related assets and landscape connectivity resources. The report's scope explicitly covered water resources (rivers/laggas, springs, wetlands), wildlife corridors and dispersal areas, livestock routes and dry-season grazing areas, islands of dense vegetation, and salt licks, yet these categories fall under multiple agencies and levels of government with no single custodian consistently accountable for day to day protection.

This fragmentation was not theoretical—it manifested as an implementation vacuum: assets were identified and mapped, but the governance arrangements needed to translate mapping into enforceable management (designation, reservation, by laws, custodianship, monitoring mandates) were not coherently triggered. Similar coordination gaps were acknowledged in the pilot processes across counties, where the same mapping approach had to rely heavily on institutional legitimacy and multi agency collaboration to gain trust and harmonize actions.

4.3.2 Weak Operationalization of Strong Legal Provisions

The mapping process confirmed a persistent pattern: Kenya's statutes provide tools that are strong on paper but weakly activated in practice. The project was designed to generate geo referenced evidence for protection and conservation decisions, including guiding reservations, gazettement, and development control, but the report also shows that—despite the availability of legal pathways—the practical conversion of mapped assets into legally secured spaces remains limited.

A key gap observed is that procedural steps (who initiates designation, what documentation threshold is required, which agency becomes custodian, what enforcement instruments follow, and how county plans must reflect the designation) are rarely standardized or consistently applied across asset categories. In effect, mapping improves visibility and legitimacy, but without routine legal activation, mapped assets remain vulnerable to encroachment and land-use change.

4.3.3 Insufficient Recognition of Dryland Socio Ecological Systems in Law

A central lesson from the mapping scope itself is that ASAL functionality depends on mobility, seasonality, and landscape connectivity, not on static "sites" alone. Yet legal recognition and protection mechanisms are still more developed for conventional categories (e.g., forests, protected areas, riparian reserves) than for ASAL specific assets such as livestock routes, dry season grazing areas, salt licks, and "islands of dense vegetation" outside formally gazetted forests. The Laikipia inventory deliberately included these categories—highlighting their ecological and livelihood role—yet their legal pathways for secure recognition remain comparatively thin or inconsistently applied.

The risk is practical: where legal categories are weak or absent, ASAL assets become easier to fragment through fencing, subdivision, settlement expansion, and infrastructure siting—precisely the land use pressures the mapping was meant to anticipate and manage through spatial baselines and planning controls.

4.3.4 Enforcement Deficits and Limited Institutional Capacity

The mapping approach relied on field verification, community guidance, and daily data quality checks, underscoring that effective governance requires consistent field presence, monitoring routines, and enforceable controls, not just laws.

However, the broader pilot experience (including Samburu's documented challenges) illustrates how capacity constraints, terrain/remoteness, language barriers, and community expectations complicate enforcement and compliance in drylands—even when rules exist.

In the dryland counties context, this enforcement gap is especially consequential because these counties sit within wider rangeland systems and connectivity corridors. Where enforcement is sporadic, the cumulative effect is incremental encroachment—often becoming "normal" land use before regulators respond.

4.3.5 Weak Integration of National Laws into County-Level Instruments

Devolution places counties at the center of spatial planning and development control, yet the mapping findings point to a recurring structural weakness: national legal intentions are not consistently translated into county planning instruments, zoning, and enforceable by laws. The mapping initiative explicitly aimed to influence county and national plans, support reservations/gazettement, and strengthen governance through evidence-based spatial baselines.

Where county spatial plans and development control do not explicitly recognize mapped assets as planning constraints and protected zones, the legal framework remains abstract. This is particularly critical for ecologically sensitive features that require site-specific controls (buffer rules, regulated access, seasonal restrictions, corridor protection measures, and prohibition of incompatible subdivisions).

4.3.6 Limited Use of Community Land Act Provisions to Protect Communal Assets

The mapping rationale explicitly recognizes that community knowledge and participation are fundamental to identifying and validating assets, and the methodology relied on participatory approaches and indigenous knowledge integration.

Yet the practical protection of communal assets remains constrained where community land tools (local by laws, community governance arrangements, customary access rules formalization, and integration into land registers) are not systematically linked to mapping outputs.

Experience from the pilot processes shows that trust and tenure anxieties are real barriers: communities sometimes feared mapping could lead to land loss, requiring NLC-led clarification and confidence-building. This demonstrates the legal-policy paradox: community land mechanisms are among the most appropriate pathways for protecting ASAL commons, yet they are the most sensitive to deploy without strong tenure safeguards, technical support, and clear benefit narratives.

4.3.7 Procedural and Transboundary Gaps: Gazettement, Reservations, and Inter County Connectivity

A key omission in many legal critiques is that the problem is not only fragmented mandates, but also weak procedural bridging instruments. The report repeatedly frames mapping as a foundation for reservations, gazettement, and landscape connectivity management across wider systems.

Yet the operational procedures that would standardize this transition—criteria for listing an asset as "critical," documentary thresholds, roles of county vs national agencies, and how inter county assets should be handled—remain uneven.

This is especially important because rangeland resources and wildlife/livestock mobility systems are transboundary by nature; without explicit inter county instruments and shared governance structures, county-by-county protection can leave "gaps" that undermine the entire connectivity network the mapping reveals

4.4 Emerging Legal Issues

Dryland natural asset mapping is increasingly used to create authoritative inventories that support decision making, strengthen governance, and enable legal protection of critical resources through instruments such as reservations and gazettement, while improving public access to information through atlas-style products. However, as mapping becomes more central to land and natural resource governance, several emerging legal issues arise that Kenya's framework must address more directly to ensure that maps translate into enforceable protection and sustainable use.

1) Tenure, Mobility and Access Rights in a Mapped Landscape

A persistent issue is how mapping interacts with land tenure arrangements and resource access regimes in drylands. Mapping makes resources visible and contestable, yet dryland livelihoods depend on mobility and seasonal access rather than fixed, exclusive site control. Legal and policy frameworks therefore need clearer guidance on how mapped assets (e.g., water points, grazing reserves, routes) are secured without undermining legitimate mobility-based access, and how rights of use are recognized where tenure is layered (public/community/private) or not fully formalized. This is foundational because the mapping rationale is to strengthen governance of land-based resources nationally, yet governance outcomes depend on how tenure and access are handled after mapping.

2) From "Mapped" to "Legally Secured": Designation, Reservation and Planning Integration

A key emerging issue is the legal "conversion pathway" from mapped features to enforceable protection. Mapping is meant to inform decisions and facilitate legal protection through tools such as reservations in land cadastres and gazette notices, and to guide management actions. Yet, in practice, many frameworks are stronger on identifying assets than on specifying:

- which authority triggers legal protection once an asset is mapped,
- what evidentiary threshold the map must meet,
- what instrument applies to each asset type (reservation, gazettement, by law, easement, special planning controls), and
- how mapped assets must be embedded into spatial plans, development control, and licensing decisions.

This gap allows mapped resources to remain "known" but not "secured," weakening the governance value of inventories that were intended to streamline management.

3) Ecological Connectivity, Transboundary Systems and Ecosystem Scale Governance

Dryland systems function through landscape connectivity (corridors, dispersal areas, routes, seasonal refugia) and often cut across administrative boundaries. Mapping makes these networks visible, but legal frameworks still tend to rely on site-based protection approaches, which are often insufficient for connectivity-dependent systems. The emerging issue is the need for enforceable governance mechanisms that recognize:

- ecological networks as governance objects (not just discrete sites), and
- coordination where assets span multiple jurisdictions.

International guidance on conserving connectivity through ecological networks illustrates the growing global recognition that corridor governance requires standards and coordinated planning, which mapping now makes practically necessary.

4) Climate Risk, Seasonality and Adaptive Legal Instruments

Dryland assets are highly dynamic under climate variability (seasonal water availability, drought cycles, shifting grazing patterns). Mapping provides a baseline, but the emerging legal issue is that static legal designations and rigid use rules can become misaligned with changing ecological conditions. Frameworks increasingly need adaptive instruments—rules that accommodate seasonality and climate shocks, support resilience-building actions, and enable periodic updating of mapped baselines without reopening tenure insecurity or conflict over access.

5) Digital Governance and the Legal Status of Spatial Data

Mapping is now fundamentally digital: inventories are designed to become data hubs that support decisions and streamline governance. This raises new legal questions about:

- **data custodianship** (who holds and maintains the authoritative dataset),
- **evidentiary status** (whether mapped layers must be considered in approvals, EIAs, subdivision decisions, and enforcement),
- **interoperability** with statutory land information systems and planning workflows, and
- **sensitive data protection,** given that some mapped assets can be conflict-sensitive or culturally sensitive.

Without clear digital governance rules, spatial evidence can remain technically strong but legally optional—limiting its effect on real decisions.

6) Enforcement, Accountability and Institutional Coordination

Even where laws exist, mapping highlights that effective protection depends on enforcement capacity and clear accountability. An emerging issue is how enforcement agencies and counties operationalize mapped evidence: who monitors, who acts on encroachment, and how compliance is verified. Because dryland natural resource governance is shared across levels of government, strengthening accountability mechanisms and coordination is critical if mapping is to move beyond documentation toward sustained protection and restoration.

5. DISCUSSION

5.1 Water Resources and Availability

Laikipia County lies within Kenya's arid and semi-arid lands (ASALs), characterized by low and erratic rainfall averaging below 600 mm annually. Despite this climatic constraint, the county is endowed with diverse water resources. The main surface water sources include rivers such as Rongai, Timau, Ontuleli, Likii, Sirmon, Nanyuki, Narumoru, Burguret, Mutara, Pesi, Suguroi, and Ewaso Narok. Other critical water sources in the county comprise ponds, rock catchments, sand dams, springs, and wetlands, which play an essential role in supporting both people and ecosystems.

However, Laikipia faces significant water insecurity challenges. Its semi-arid climate, coupled with increasing dependence on surface water sources that are drying up, has made water availability highly unpredictable. Climate change, deforestation, and land degradation have exacerbated the situation, resulting in erratic rainfall patterns, declining river flows, and seasonal water shortages. These factors collectively limit the availability of sufficient water to meet domestic, agricultural, and livestock demands.

Despite these challenges, Laikipia offers several opportunities for improving water security. These include expanding access to reliable water sources, enhancing agricultural and livestock productivity through better water management, and promoting water-related economic development. Harnessing these opportunities requires a focus on sustainable use, conservation of catchments, and integrated planning.

Seasonal water availability is a critical factor shaping livelihoods in Laikipia. The county experiences distinct wet and dry periods, with concentrated rains followed by prolonged dry spells. This seasonality directly affects the quantity and reliability of both surface and groundwater sources. Rivers and ponds often dry up during the dry season, leading to increased reliance on groundwater and rainwater harvesting systems. While water is relatively accessible during the rains, the dry season brings higher costs, longer distances, and greater effort required for water collection. This seasonal variation impacts domestic water supply, agricultural practices, and community management efforts.

Ensuring secure and reliable water access is vital for the resilience of Laikipia's dryland communities. Planning new water points must be done with careful consideration of livestock mobility patterns and seasonal grazing areas to avoid unintended consequences such as

pasture degradation, reduced livestock productivity, and increased conflict among users. Equally important is the establishment and strengthening of community management and governance systems, which are essential for the sustainability and reliability of water investments.

5.2 Wildlife Resources

Laikipia is a significant wildlife region in Kenya, renowned for its rich biodiversity and relatively stable wildlife populations. These diverse populations are supported by extensive wildlife dispersal areas that are critical for the movement and migration of species. The dispersal areas connect various habitats and protected areas, enabling wildlife to access essential resources such as pasture, water, and breeding grounds. They also facilitate genetic exchange between populations, helping to prevent inbreeding and maintain healthy, resilient wildlife communities. Furthermore, these areas allow wildlife to reduce predation risk by accessing safer habitats across the landscape.

Despite their vital role, wildlife dispersal areas in Laikipia face mounting challenges. Habitat loss and degradation, fragmentation, and barriers to wildlife movement—including fencing and infrastructure development—are increasingly restricting the natural movement of species. Human-wildlife conflict (HWC), land-use changes, insecurity, and the impacts of climate change are further compounding these threats, limiting wildlife access to critical resources and undermining ecosystem health.

Addressing these challenges requires a multi-faceted and inclusive approach. Key strategies include integrating wildlife dispersal areas into land-use and county spatial planning, restoring degraded habitats, securing migratory routes, and fostering community engagement in conservation efforts. The development of ecotourism initiatives that provide direct benefits to local communities can also create strong incentives for wildlife conservation, helping to balance ecological, economic, and social needs.

5.3 Livestock Resources

In Laikipia County, livestock routes and dry season grazing areas play a vital role in supporting pastoralist livelihoods. The county's semi-arid climate, combined with a strong reliance on pastoralism, shapes livestock movements across the landscape. During dry periods, livestock owners move their herds along established routes to access pasture and water, following seasonal rainfall patterns. In the more arid parts of the county, browse—including the leaves and twigs of trees and shrubs—becomes a critical source of nutrition for livestock. Areas such as Laikipia North are particularly rich in browse species, including acacia and commiphora, which provide essential forage during droughts.

Despite the importance of these routes and grazing areas, they face significant challenges. Increasing drought frequency, climate variability, and resource-based conflicts are major threats to the sustainability of pastoral systems. These pressures lead to pasture scarcity, drying water sources, and heightened tensions between pastoralists and other land users, particularly private ranchers. Such conflicts often intensify during dry spells when livestock are moved over long distances in search of water and forage, putting additional strain on both natural resources and community relations.

At the same time, Laikipia offers important opportunities for safeguarding and enhancing livestock routes and dry season grazing areas. The county's varied geography, which includes high- and medium-altitude zones suitable for dairy and crop farming alongside extensive lowland rangelands, makes it well-suited for both agro-pastoralism and traditional pastoralism. These landscapes, together with the deep knowledge and resilience of pastoralist communities, provide a strong foundation for initiatives that can secure livestock mobility, improve rangeland management, and reduce conflict through integrated land use planning and community-based governance.

5.4 Islands of Dense Vegetation

Laikipia County in Kenya is home to diverse vegetation types, including important islands of dense vegetation scattered across its landscape. These areas of dense vegetation play a critical role in sustaining the county's ecosystems, supporting biodiversity, and contributing to human livelihoods. They provide a range of vital ecological services, such as watershed protection, habitat for wildlife, and sources of non-timber forest products. Additionally, these vegetation patches contribute to climate regulation through carbon sequestration, helping to mitigate the effects of climate change.

In essence, islands of dense vegetation in Laikipia are invaluable natural assets that underpin environmental health, biodiversity conservation, and the well-being of local communities. Protecting and sustainably managing these areas is essential for securing the long-term ecological and economic prosperity of the county.

Despite their importance, these dense vegetation areas face several challenges. Biodiversity loss, resource scarcity, and environmental degradation are growing concerns, driven by human activities such as overgrazing, unsustainable land use, and overexploitation of natural resources. Climate change further compounds these issues through erratic rainfall patterns, prolonged droughts, and increasing pressure on already fragile ecosystems.

At the same time, islands of dense vegetation present significant opportunities for Laikipia. They offer valuable prospects for wildlife conservation, eco-tourism development, and the sustainable use of traditional resources. These areas are also vital for watershed protection, landscape connectivity, and enhancing climate resilience through carbon storage and ecosystem restoration initiatives. Realizing these opportunities will require integrated management approaches that balance ecological integrity with local development needs.

5.5 Salt Lick Areas

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6.

6. CONCLUSION & RECOMMENDATIONS

6.1 Conclusion

Laikipia County is richly endowed with a diverse range of dryland natural resource assets that are central to its ecological integrity and socio economic development. These include rivers, sand dams, ponds, rock catchments, springs, wetlands, dryland forests, islands of dense vegetation, salt licks, wildlife, and livestock systems. Collectively, these resources underpin livelihoods, cultural heritage, biodiversity conservation, and green growth, while playing a critical role in sustaining ecosystem services and enhancing climate resilience.

Despite this endowment, Laikipia's natural assets are under increasing pressure from both climatic and human induced factors. Prolonged droughts and erratic rainfall associated with climate change are intensifying water scarcity and land degradation, while land use change, encroachment into critical habitats, and growing competition over resources are undermining ecosystem health. Human–wildlife conflict and weak governance arrangements further constrain effective protection and sustainable management of these assets.

Compounding these challenges is the limited documentation and valuation of dryland natural assets, which has constrained evidence based policy formulation, planning, and decision making. Without reliable, spatially explicit information, the full potential of these resources remains underutilised, and opportunities for sustainable investment are missed. Addressing these gaps requires a multifaceted approach that integrates ecosystem protection, sustainable resource management, community participation, and strengthened implementation of existing legal and policy frameworks.

Securing Laikipia's dryland natural assets is therefore essential to safeguarding long term ecological stability, supporting resilient livelihoods, and promoting inclusive socio economic development. Strategic investment in data, governance, and participatory planning will be critical to ensuring that these resources continue to deliver benefits for present and future generations.

6.2 Recommendations and Prioritization

6.2.1 Fast Tracking Finalisation and Implementation of the Laikipia County Spatial Plan

Fast tracking the finalization and implementation of the Laikipia County Spatial Plan should be treated as a top priority intervention, as it provides the overarching framework within which all other land and resource based investments are guided. In the absence of an approved and operational spatial plan, critical natural assets remain exposed to uncoordinated development, tenure fragmentation, and incompatible land uses.

The current dryland natural resource inventory should therefore be systematically integrated into the County Spatial Plan to guide prioritisation of land use, reservation of ecologically sensitive areas, and protection of key resource zones within the land cadastre. Priority should be given to areas hosting critical water sources, grazing areas, wildlife corridors, and other high value ecosystem assets that underpin livelihoods and landscape resilience.

Once approved, the County Spatial Plan will serve as a ten year decision making framework, enabling the County Government to sequence development interventions, direct investments to appropriate locations, and balance conservation and development objectives. Fast tracking this process is essential to safeguard Laikipia's natural assets and to ensure that subsequent sectoral actions are coherent, evidence based, and sustainable.

6.2.2 Securing Landscape Connectivity Across Private, Group Ranch, and Conservancy Lands

Much of Laikipia County has already been adjudicated and is predominantly under private tenure, with additional land held under group ranches and managed through conservancies. While these land uses have delivered important conservation and economic gains, increasing fragmentation has significantly reduced ecological connectivity between habitats. Many wildlife and livestock movement corridors that historically linked group ranches, conservancies, and grazing areas have been constricted or closed altogether, limiting species movement and increasing the risk of genetic isolation and in breeding within wildlife populations.

As a priority conservation and land use intervention, the County Government should focus on securing and restoring functional connectivity between group ranches, conservancies, and adjoining rangelands. This includes safeguarding remaining open corridors and strategically re opening critical movement routes that facilitate wildlife dispersal, livestock mobility, and access to seasonal resources. Maintaining connectivity at the landscape scale is essential for sustaining viable wildlife populations, supporting pastoral systems, and reducing human–wildlife conflict in an increasingly fragmented and urbanising county.

Given the dominance of private and group land tenure, connectivity should be secured through negotiated, incentive based, and planning led mechanisms, rather than compulsory acquisition or blanket protection. These may include the incorporation of movement corridors into County Spatial Plans, voluntary conservation easements and access agreements with landowners, co management arrangements among neighbouring conservancies and group ranches, and targeted modification of fencing and other barriers. Such approaches allow corridors to remain functional while respecting existing land rights and economic uses.

Strengthening connectivity across privately owned, group ranch, and conservancy landscapes will reduce ecological isolation, minimise in breeding risks, and enhance the long term resilience of Laikipia's wildlife populations and pastoral livelihoods. Failure to secure these linkages risks permanent fragmentation of habitats, undermining decades of conservation investment and compromising the county's ecological and socio economic future.

6.2.3 Gazettement of Critical and Vulnerable Assets for Public Use

The gazettement of critical and vulnerable assets involves a process where assets, on community and private, are officially designated as critical resources providing a layer of protection. This designation, typically published in the Kenya Gazette, allows for the implementation of specific protections and security measures.

Why gazette these critical and vulnerable assets for public use?

- **Protection and Preservation:** Gazetting provides a legal framework to protect critical natural assets from encroachment, pollution, and unsustainable exploitation. This includes designating them as protected areas, establishing regulations for their use, and enforcing conservation measures.
- **Sustainable Use:** By formally recognizing these assets, gazetting promotes their sustainable use and management, ensuring they continue to provide valuable services for current and future generations.
- **Community Benefit:** Gazetting can facilitate access to natural resources for local communities, ensuring they benefit from the services provided by these assets, such as clean water, food security, and recreational opportunities.
- **Policy and Planning:** Gazetting provides a basis for informed decision-making and land use planning, ensuring that development and other activities do not compromise the integrity of these important resources.
- **Scientific Understanding:** Gazetting can support scientific research and monitoring of these assets, enabling a better understanding of their ecological functions and how they respond to environmental changes.
- **International Commitments:** Gazetting can help countries meet their international obligations related to biodiversity conservation, climate change mitigation, and sustainable development.

In essence, gazetting is a crucial step in recognizing and protecting the natural assets that underpin human well-being and sustainable development. Table 25 summarises the various natural assets proposed for gazettement:

Table 25: Proposed Gazettement of Critical and Vulnerable Assets for Public Use

Priority Resource/Site	Issues/Threats	Proposed Conservation Measures
Mukutan-Luoniek corridor	It forms part of a larger north-south connectivity system crucial for wildlife movement between the Laikipia plateau, Samburu, and further north into the Mathews Range.	• Inter county dialogues • Inter-county physical and land use planning • Inter-county natural resource committee tasked with setting grazing plans alongside other attendant regulations. • Gazettement in accordance with the Wildlife Act, 2013
The Mugie–Loisaba corridor	This corridor provides a critical westward outlet for wildlife moving from the Laikipia Plateau across the Great Rift Valley escarpment toward Baringo lowlands and beyond. It is one of the few remaining relatively open routes across Laikipia's western edge.	
The Mugie–Loisaba corridor	This corridor is essential for north-south wildlife movement between Laikipia's northern ranches and community conservancies linking Laikipia's private and community conservation landscapes into a larger functional ecosystem.	
Nkoteiya–Kirisia corridor	A vital ecological linkage in Samburu County, connecting Nkoteiya (a dryland community area near Westgate Conservancy and northern Laikipia) to the Kirisia Forest (a large montane forest block providing permanent water and refuge for wildlife).	
Mugie –Luoniek-Mukutan Conservancy Corridor	• Habitat fragmentation and blockage of wildlife movement • Land use change and subdivision • HWC • Insecurity and resource conflicts	

1. Parcel LR No. 1091, Luoniek Location	• Public land reserved from Luoniek settlement as a wildlife corridor. • The corridor is part of the broader Laikipia–Samburu–Isiolo rangeland system, linking: Laikipia Conservancies (e.g., Ol Jogi, Mpala, Loisaba), Community lands and group ranches in Mukogodo and Il Ngwesi, Samburu National Reserve and surrounding landscapes. • The parcel also functions as a dry-season refuge and grazing passage and an important for gene flow and maintaining ecosystem connectivity between fragmented conservation lands.	• Reserve as public land under section 15 of Land Act, 2012 • Gazettement as a corridor in accordance with the Wildlife Act, 2013
2. Ewaso Narok and Pesi Wetlands	Human encroachments	• Wetland rehabilitation and protection • Enforce wetlands regulations • Community participation in the protection of these wetlands • Development control and enforcement
3. Parcel No. LR No. 1092 in Luoniek Location (public land)	• Vital water catchment area for locals. • The parcel is rich in Mtamayo and Acacia tree species and play a critical role as a grazing areas for both livestock and wildlife • Face significant threats including the ongoing inter-tribal violence over pasture and water access, mainly involving Pokot and neighbouring groups as well as severe charcoal burning.	• Reserve as public land under section 15 of Land Act, 2012 • Gazettement in accordance with the Water Act, 2016
4. Ewaso Narok and Ewaso Nyiro rivers riparian reserves	• Human encroachments	• Demarcation of riparian reserves. • Riparian buffering preferably with native trees • Development control and enforcement
5. Salt licks protection at PND scheme	• Access and user rights by communities	• Invoke conservation easement as per EMCA

6.2.4 Commission survey of the Priority sites cadastral standards for gazzettement

To Commission survey of the priority assets to cadastral standards for gazettement, one needs to follow a structured process involving surveying, plan preparation, and submission to relevant authorities. This includes conducting surveys, creating cadastral maps, and boundary plans and potentially obtaining permits or approvals from the relevant government agencies like the State Department for Lands and Physical Planning.

By dint of Section 35 (1) of the Wildlife Conservation and Management Act, 2013, the Cabinet Secretary may, upon national reserve. recommendation of the relevant county government and after consultation with the National Land Commission, by notice in the Gazette, declare any land under the jurisdiction of a county government to be a national reserve where the land is —

a. rich in biodiversity and wildlife resources or contains endangered and threatened species;

b. an important catchment area critical for the sustenance of a wildlife conservation area;

c. an important wildlife buffer, zone, migratory route, corridor or dispersal area.

Additionally, Section 2 of the Act, defines a "**national reserve**" as an area of community land declared to be a national reserve under this Act or under any other applicable written law. The above legal provision will guide on the gazettment of the identified key wildlife migratory route, corridor or dispersal area. Equally, section 31 (1) of the Wildlife conservation and management Act, 2013, provides that the Cabinet Secretary, may in consultation with the competent authority, by notice in the Gazette — **c) declare a wetland** to be a protected area under the management of the Service. This legal provision can be invoked in the gazeettment of the proposed Ewaso Narok and Pesi wetlands. These are vital avenues for protection of these fragile resources. Here are the detailed steps for survey of the proposed priority sites cadastral standards for gazzettment:

1. **Identification of Priority Sites:**Determine the specific locations or properties that need to be surveyed and meet the cadastral standards for gazettement.
2. **Survey Planning:** Develop a detailed survey plan that outlines the scope, objectives, and methods to be used.
3. **Survey Execution:** Conduct the necessary surveys using appropriate surveying methods, equipment, and techniques.
4. **Data Processing:** Process the collected survey data to create accurate and reliable cadastral maps and plans.
5. **Plan Preparation:** Prepare cadastral maps and plans that meet the required standards, including the use of special forms, scales, and plotting methods, as specified in Survey Regulations.
6. **Submission:** Submit the completed cadastral maps and plans to the relevant authorities for review and approval.
7. **Gazettement:** Once the cadastral maps and plans are approved, they can be gazetted, making them publicly accessible and legally binding.

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APPENDICES

Appendix 1: Stakeholders Report

Appendix 2: Assets Inventory