

**COMMUNITY LAND MANAGEMENT SYSTEMS AND BIODIVERSITY  
CONSERVATION IN LAIKIPIA COUNTY, KENYA**

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## **DECLARATION**

This study report is my original work and has not been presented for a degree any other university.

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## **LIST OF ABBREVIATIONS AND ACRONYMS**

<b>CBO</b>	:	Community Based Organization
<b>CLT</b>	:	Community Land Trust
<b>GEF</b>	:	Global Environment Facility
<b>IUCN</b>	:	International Union for Conservation of Nature
<b>KEFRI</b>	:	Kenya Forestry Research Institute
<b>KI</b>	:	Key Interview
<b>KFS</b>	:	Kenya Forest Service
<b>KWRTI</b>	:	Kenya Wildlife Research and Training Institute
<b>KWS</b>	:	Kenya Wildlife Service
<b>LWF</b>	:	Laikipia Wildlife Forum
<b>MRC</b>	:	Mpala Research Centre
<b>NEMA</b>	:	National Environment Management Authority
<b>NGO</b>	:	Non-Governmental Organization
<b>OB</b>	:	Observation
<b>SDG</b>	:	Sustainable Development Goals
<b>UNEP</b>	:	United Nations Environment Programme

## OPERATIONAL DEFINITION OF TERMS

**Biodiversity conservation** is conceived as sustainable management and protection of natural habitats and biological resources to ensure the long-term survival of species and the healthy environment in Laikipia County. This is the dependent variable, and it was indicated by change in land use, forest cover, abundance of species and diversity of species

**Community bylaws** are considered as the rules, regulations and guidelines set by a community on land use and management.

**Community land management practices** are viewed as the collective administration of land and natural resources by the community who reside in Laikipia County. As the main independent variable, its constructs were governance structure, decision-making approaches, community land registration and enforcement structure.

**Community land registration process** is considered as acquiring and documenting ownership of community land. It is the third independent variable, and its indicators were mobilization, documentation, and validation.

**Decision-making approach** is conceived as the ways in which community use when deciding on the management of community land. This the second independent variables and its indicators were participation level, adaptiveness, and conflict resolution.

**Enforcement structures** is perceived as ways of ensuring that the rules, norms, and decisions on community land management are followed. As the last independent variable, its indicators were mmonitoring, incentives and accountability.

**Governance structure** is considered as the process in which the community of Laikipia County organizes itself while managing the community land. As the first independent variable, it was indicated by leadership, working groups and collaboration frameworks.

## ABSTRACT

Community land management systems and biodiversity are closely interconnected, with community-based approaches. This study examined the effects of community land management systems on biodiversity conservation in the context of Laikipia County in Kenya. The research objectives were to establish the effects of governance structures, decision-making approaches, community land registration process and enforcement structures on biodiversity conservation Laikipia County in Kenya. In carrying out this study, stakeholder theory, theory of management of common pool resources and sustainability theory were the founding theoretical frameworks. Descriptive survey with cross-sectional approach was used to execute the study. The targeted population was 2,035 consisting of 6 Ministry of Land and Environment Officers in Laikipia County, 29 managers of conservancies and it also included 2,000 community land representatives in Laikipia County. The sample size of sample size of 327 was obtained through Krejcie and Morgan (1970) sample-determination table. Proportionate stratified random sampling was adopted. Before collecting data, authorization was acquired from the relevant agencies. Data was gathered through triangulation of structured questionnaires, interviews, and observation guide. Pilot-testing of the instruments was conducted in Samburu County to sample size of 10% of the real study. Validity was enhanced through matching constructs with the questions in the data collection instruments. Reliability was determined through split-half method. Qualitative data was analyzed via content analysis. Numerical data collected by means of structured questionnaires was analyzed through descriptive statistics (means, frequencies, percentages, and standard deviations) and inferential statistics (coefficients of correlation and determination and Beta coefficients). Relationship between variables was determined via Pearson's Product Moment Correlation Method. Regression analysis was used to predict the biodiversity conservation given community land management systems using F-test at 95% confidence interval. Descriptive statistics revealed that for the overall mean of 4.04 majority of respondents strongly agreed governance structure had great contribution to biodiversity conservation in Laikipia County. For the combined mean of 3.98, 3.96, 3.98, most of the respondents were in agreement that decision-making approaches, community land registration process and enforcement structures contributed to biodiversity conservation in Laikipia County. The strength of influence of community land management systems on biodiversity conservation in Laikipia County decreased in the following order: enforcement structures, decision-making approaches, governance structure and community land registration process. Community land management system accounted for 81% variation in the biodiversity conservation in Laikipia County ( $R^2=0.56$ ). It was therefore concluded that that enhancing community land management through improved governance, inclusive decision-making, effective land registration and strong enforcement mechanisms can significantly contribute to better biodiversity conservation outcomes. The Government was recommended to develop and enforce policies that support inclusive and participatory governance structures for community land management. Practitioners including conservation lists, managers and administrators should implement participatory approaches and initiate training programs to build and empower the community members and leaders on sustainable land management practices and the importance of biodiversity conservation.

## **CHAPTER ONE: INTRODUCTION**

### **1.0 Introduction**

This chapter explores the background and the background of the problem, research objectives and questions. Also discussed are the study assumptions and justification. Finally, the scope and limitations of the study are summarized.

### **1.1 Background to the Study**

Biodiversity conservation is a global priority due to its vital role in maintaining environmental health, supporting human well-being, and ensuring the planet's sustainability. A balanced ecosystem is essential for sustaining life, making biodiversity conservation a key driver in achieving the Sustainable Development Goals (SDGs). Specifically, SDG 15 emphasizes the need to protect and restore terrestrial ecosystems, promote the sustainable use of natural resources, manage forests responsibly, combat desertification, and halt biodiversity loss (Santos et al., 2022). Amongst the strategies being adopted to this realization includes formation of various international agencies and consortiums like United Nations Environment Programme (UNEP), International Union for Conservation of Nature (IUCN), Global Environment Facility (GEF) at global level. There is also growing rate of adoption of community land management systems in biodiversity conservation (Danielle et al., 2022; Abdalla & Hood, 2019). This approach recognizes the interconnectedness nature between humans and the environment and aims to ensure that the well-being of both the community and the ecosystem is preserved.

Community land management system involves the use of various community-based biodiversity conservation efforts that focus on sustainable land use, wildlife conservation and community development (Austine, 2017). In the United States of America, achievement of stable biodiversity is advanced through Community Land Trust (CLT), a corporation that holds and manages land assets of a given place on behalf of community (Terra Nostra Press, 2020). But the findings from a study by Talbot (2023) exploring on the impacts of the land trust model on environmental conservation in Northern California found that inadequate involvement of diverse people with different background from the local setting was undermining sustainable realization of biodiversity conservation. These deficiencies were resulting into

proliferation of habitat loss, land fragmentation, invasive species, climate change and increased vulnerability of protected areas. In Europe, there is growing innovation in the community land governance with focus shifting into collaborative management of rural forest resources between the locals and state forest-services to increase the value of the land property and enhance biodiversity (Auzins, 2022). Nevertheless, the findings from a study by Hoffmann (2022) exploring the challenges and opportunities of area-based conservation in reaching biodiversity and sustainability goals reveals that lack of adaptive management and systematic framework of enforcement of conservation rules degraded effectiveness and efficiency of biodiversity conservation the local level of Europe but also at the regional and global levels. If unchecked, this would result into increased fragmentation of habitats, loss of biodiversity and overexploitation of resources.

In many of the socialist and communists' states in Asia, resource ownership affects the way land resources are controlled and biodiversity conserved. For instance, Japan, China, India, and Indonesia have adopted area-based or community-based conservation strategies aimed at ending exclusionary approaches but promote equity, inclusivity, and respect to human rights in biodiversity conservation and climate change mitigation. This approach draws recognition of the land and resource rights of the regions where indigenous peoples and local communities live (Loos, 2021). Despite the innovative strategies, destruction of habitat, natural resources and proliferation of invasive species are still rampant in many Asian countries including Russia, Australia, and Philippines (Tan et al., 2022). This pinpoints the importance of reviewing the existing community land management approaches considering the prevailing biodiversity conservation efforts for greater effectiveness.

Biodiversity conservation in African nations including Nigeria, Democratic Republic of Congo, Uganda and even Kenya continues to face various challenges due to human activities, and socio-economic factors that threat the sustainability of ecosystem. Attempts to address these challenges through African community-based conservation and land management approaches has failed to restore the integrity of landscapes and the protection of biodiversity and ecosystems in a sustainable order (Kathleen et al., 2018). Different strategies for mitigating degradation of ecosystem continue to be adopted at national levels which included but not limited to community involvement,

sustainable land-use practices, law enforcement, education, and international cooperation to ensure the preservation of biodiversity in these regions. However, there is little to celebrate as indicated by the unending loss of forest cover, habitat loss, land fragmentation, poaching and illegal wildlife trade, exploitation of resources, conflicts between wildlife and human communities over resources often lead to retaliatory killings, habitat degradation and loss of biodiversity amongst African states (Kelbessa, 2022). This necessitates a scientific investigation into the effectiveness of community-based approaches to biodiversity restoration.

Kenya has put into place robust environmental protection policies, legislation and strategies focusing on community involvement in biodiversity protection efforts. The recognition of community land rights in sustainable conservation of natural resources, biodiversity and ecosystem is emphasized in the environmental act of 2015, forest conservation and management act of 2016 and community land act of 2016 which recognizes and protection and provides the procedure for registration of community land rights. The community land act of 2016 provides the framework for management and administration of community land and the role of county governments in relation to unregistered community land. But Kenya just like other regions globally, faces significant challenges concerning the loss of biodiversity despite of balancing conservation efforts involving involvement of local communities in land management (Muigua, 2022). It implies that biodiversity conservation is a complex of intertwined dimensions that makes it a challenge to address comprehensively. This requires an empirical investigation into the effectiveness of current biodiversity conservation efforts to guide the development of suitable policy interventions.

In Laikipia County in Kenya, many community-based conservation efforts focus on sustainable land use, wildlife conservation and community development. To make them effective in protecting biodiversity, these initiatives integrate local communities, private landowners, conservation organizations, and government entities to develop more comprehensive and effective conservation strategies. However, community land management efforts have reportedly born little impacts in biodiversity protection and conservation due to poor resource management leading to overexploitation of natural resources, deforestation, soil degradation, unsustainable agricultural practices, destruction of habitat and ecosystem (Hennery et al., 2021). Addressing these

challenges requires a multifaceted understanding of how the prevailing community land management practices approach involving community engagement, policy changes, capacity building, and support for sustainable practices. Hence the need to investigate the influence of community land management systems in Laikipia County and their contribution to biodiversity conservation.

### **1.1.1 Biodiversity Conservation in Kenya**

Biodiversity conservation is vital for Kenya's diverse ecosystems and wildlife. The 2010 constitution of Kenya recognizes biodiversity conservation as a principle for sustainable development which augments protection of biodiversity, ecosystem, and environment. Still in Kenya, biodiversity conservation is identified as a crucial component for long-term economic growth and prosperity as per Kenya's Vision 2030. As a result, Kenya's has formulated, aligned, and implemented robust policies, laws, programmes, and institutional frameworks to support biodiversity conservation. Some of the renowned institutions efforts includes the Kenya Wildlife Service (KWS), National Environment Management Authority (NEMA), Kenya Forest Service (KFS), Ministry of Environment and Forestry and research institutions like Kenya Wildlife Research and Training Institute (KWRTI), Kenya Forestry Research Institute (KEFRI) and various universities which conduct research on biodiversity, wildlife, ecosystems. At the County level, great emphasis is laid on stronger collaborations between government agencies, community-based organizations, international partners and the local community members in promoting synergy addressing the threats to biodiversity to ensure its sustainable conservation across the country. Community involvement in biodiversity conservation efforts is recognized as a principle of good governance as it fosters a sense of ownership and ensures sustainability. By integrating biodiversity conservation in the national and county development plans, Kenya aims to achieve sustainable growth while preserving its natural heritage for future generations.

### **1.1.2 Biodiversity in Laikipia County**

Located at the peripheral of Central Kenya, Laikipia County borders six Counties namely: Meru, Nyeri, Nyandarua, Samburu, Isiolo and Baringo which contribute to the geographical diversity and cultural heritage of Laikipia County (County Government of Laikipia, 2023). Laikipia County has a population of 518,560

distributed across the following five sub-counties: Laikipia East, Laikipia West, Laikipia Central, Laikipia North and Nyahururu (Kenya National Bureau of Statistics, KNBS 2019). Known for its diverse landscapes and abundance of wildlife, Laikipia County is recognized as a leader in conservation efforts towards protecting the vast biodiversity and mountainous ecosystem. Biodiversity conservation initiatives in Laikipia County includes but not limited to community and private conservancies Ol Pejeta Conservancy, Loisaba Conservancy and Mpala Research Centre (MRC) which coordinates engagement with communities in conservation efforts, promotion of sustainable land use practices and protection of wildlife habitats (Muigua, 2022). Despite the interventions, Onditi et al. (2023) reports that Laikipia County continue to experience biodiversity degradation cases including land fragmentation, land degradation due to over-grazing and poor farming practices, deforestation, invasive species, water scarcity due to destruction of water resources, poaching, illegal wildfire trade and human-wildlife conflicts.

A study by Danielle et al (2022) reveal that biodiversity conservation is largely influenced the community land management practices in that involvement of local communities in managing and making decision of their land and natural resources leads to sustainable practices that benefit biodiversity. The governance structure within a community plays a crucial role in shaping how land is managed and how biodiversity conservation efforts are implemented and delivered. This was established from a study by Huang, McDonald, and Seto (2018) when exploring the importance use of land governance for biodiversity conservation in an era of global urban expansion as it greatly affected sharing and control of natural resources which in turn affects the extent of participation in conservation activities. While community land registration can positively impact biodiversity conservation based on the prioritization of conservation alongside local needs and aspirations, complementation of land registration process with appropriate policies and capacity-building initiatives is essential for attaining sustainable biodiversity conservation (Katusiime & Schutt, 2020). In overcoming the methodological, conceptual, contextual, theoretical and generalization limitations in past studies, this study used mixed methods, relevant theoretical frameworks, and elaborate definition of community land management systems to determine its influence on biodiversity conservation in Laikipia County in Keya.

## **1.2 Problem Statement**

Laikipia County, nestled in the heart of Kenya, is celebrated for its incredible biodiversity, distinct ecosystems, and a wide array of wildlife. This region has become a key player in conservation efforts, both on a local and national scale, with various strategies in place to protect its ecological health. One of the main approaches being embraced in Laikipia is community land management systems, which empower local residents to take charge of their land while also safeguarding the area's rich biodiversity. These systems are crafted to encourage sustainable land use, instill a sense of ownership and responsibility among community members, and ensure that conservation initiatives resonate with local needs and priorities (County Government of Laikipia, 2023). Yet, despite some promising advancements, the long-term success of these community land management systems in preserving biodiversity is still up for debate. The county grapples with significant challenges that jeopardize its ecological balance. For instance, in 2022, Laikipia recorded over 130 incidents of human-wildlife conflict, including crop damage (50% of cases), attacks on people (27.3%), and livestock losses (17.6%) (Mwangi, 2022; Malesi, 2023). Other ongoing issues like poaching, illegal wildlife trade, and deforestation due to unlawful logging and unsustainable land practices further complicate the delicate balance between human livelihoods and ecological conservation in the area. While Kenya's Vision 2030 highlights the importance of community-driven conservation for protecting biodiversity and ecosystem services, there are still gaps in how these systems are implemented and their overall effectiveness.

For instance, a study by Kaua (2023) found that traditional governance structures were successful in managing ecological pressures within pastoralist communities in Laikipia. Another study assessing the influence of community values, rules and knowledge on biocultural conservation in Lebanon by Baydoun et al. (2023) found that participatory decision-making enhanced conservation strategy in protecting biodiversity. But contextually, the generalization of the finding was limited to Lebanon rather than in Kenya. Cheng et al. (2019) explored the effects of law enforcement and community outreach on mammal diversity in a biodiversity hotspot in China and the findings revealed that community law enforcement and outreach programmes were found to have no directly relationship with abundance of

biodiversity. However, the studies fell short in representing farming communities, which limits its broader applicability.

### **1.3 Objectives of the Study**

The study sought to:

1. Assess the effects of governance structures on biodiversity conservation in Laikipia County, Kenya
2. Establish the effects of decision-making approaches on biodiversity conservation in Laikipia County, Kenya
3. Examine the effects of community land registration process on biodiversity conservation in Laikipia County, Kenya
4. Determine the effects of enforcement structures on biodiversity conservation in Laikipia County, Kenya

### **1.4 Research Questions**

The study aimed to address the following questions:

1. What are the effects of governance structures on biodiversity conservation in Laikipia County, Kenya?
2. How are the effects of decision-making approaches on biodiversity conservation in Laikipia County, Kenya
3. What are the effects of community land registration process on biodiversity conservation in Laikipia County, Kenya?
4. How are the effects of enforcement structures on biodiversity conservation in Laikipia County, Kenya?

### **1.5 Research Assumptions**

It is assumed that the target population is homogenous and normally distributed to allow for the application of parametric tests during data analysis. However, the normality assumptions were tested using Shapiro wilk`s test. The study was also built on the presumption that community land management systems have some interaction effects with the biodiversity conservation in Laikipia County, Kenya and that there are no hidden variables affecting the outcomes. The research respondents were also presumed to have the understanding of the community land management systems and that they were cooperative, objective and honest in their responses.

## **1.6 Justification and Significance**

Laikipia County provides a unique ecological and socio-cultural context where community land management systems are being increasingly relied upon to drive biodiversity conservation. Although these systems play a pivotal role, their de facto efficiency has been the subject of insufficient research, particularly in pluralistic community contexts involving pastoralist and farming communities. Past studies have either been too limited in their investigation into specific groups or have remained lacking in contextual relevance for Kenya. Furthermore, the constant challenges of human-wildlife conflict, illegal timber logging, and land degradation suggest that existing strategies may be ineffective or not being effectively enforced. Therefore, this study is justified in its aim to critically assess the contribution of community land management systems in terms of governance, decision-making, land registration, and enforcement to biodiversity conservation in Laikipia. By addressing methodological, contextual, and conceptual gaps, the study seeks to offer pragmatic recommendations and evidence-based guidance on how best to enhance conservation outcomes.

The findings from this research are expected to benefit multiple stakeholders, including the National Government, Laikipia County Government, environmental conservation practitioners, and future scholars. For government agencies, the study offers actionable insights into how community land management systems impact biodiversity, which can inform policy reforms, development of inclusive guidelines, and effective community engagement strategies. Environmental conservatists may use the findings to enhance participatory approaches grounded in shared values, inclusivity, and collaboration principles that are crucial for sustainable land management and biodiversity protection. For the academic community, the study contributes new knowledge to the existing body of literature by contextualizing biodiversity conservation within the framework of community land management in Laikipia County. It also provides a basis for future comparative research in other regions and opens up opportunities to explore emerging themes and address study limitations in further research

## **1.7 Scope of the Study**

This research focuses on community land management systems relative to biodiversity conservation in Laikipia County Government only. Laikipia County

forms the unity of analysis upon which the findings were generalized. A descriptive survey research design was adopted to gather detailed information about the community land management systems so as to provide comprehensive overview of various aspects the phenomenon relative to biodiversity conservation outcomes. The study adopted stratified random sampling method to ensure fairness and representativeness in the selection of respondents and elimination of sampling errors. Both structured questionnaires, interviews guides and observation were triangulated during data collection so as to enhance validity and reliability of the findings. Respondents for this study was the local community leaders and environment conservatists from the private and public organizations. This mix of different respondents offered broad and varied perspectives for enriching the data from different viewpoints, experiences, and insights so as to reduce biasness but increase validity and generalizability of the findings.

### **1.8 Limitations of the Study**

The generalization of the findings from the study was limited to settings of Laikipia County. However, the use of probability sampling promoted representation essential for generalization of the findings. While the aspects of community land management systems are vast and broad and vast in literature, this study confines community land management systems to the following four constructs: governance structures, decision-making approaches, community land registration process and enforcement structures. These constructs were unique to the research settings and therefore offered practical remedy to the issues of attaining sustainable biodiversity conservation in Laikipia County. Due to time and resource constraints, cross-sectional approach to descriptive survey was used to collect data at one point and time in Laikipia County. This limited collection of longitudinal data that provides insights into the development trends and patterns about the variables. Nevertheless, the use of cross-sectional approach was effective in identifying the patterns and associations in that time frame of the study to offer insights of the existing relationship at that particular moment

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

In this chapter, the broad literature on community land management and biodiversity conservation is reviewed in line with the following research themes: governance structures and biodiversity conservation, decision-making approaches and biodiversity conservation, community land registration process and biodiversity conservation, and enforcement structures and biodiversity conservation. Specifically, empirical studies were reviewed to identify knowledge gaps and indicators to support this study. While knowledge gaps are presented in a table, the conceptual flow of variables and indicators are illustrated in a figure. The theoretical underpinnings for this study are also discussed.

### **2.2 Empirical Review**

In this section empirical literature is critically reviewed pursuant to the research themes.

#### **2.2.1 Governance Structures and Biodiversity Conservation**

A meta-evaluation study was conducted by Danielle et al., (2022) exploring on governance structures and biodiversity conservation found that community governance through structured controls, leadership promotes inclusive responsibility in solving environmental challenges. The exploratory study used a case study design, purposive sampling of 158 cases, qualitative methodologies in data collection and analysis. The finding collaborates with those of Armitage et al., (2020) focusing on governance principles and biodiversity conservation in Canada, South Africa, and Netherlands that community-centered conservation governance promotes equity, collaboration and rights approach leading to effective outcomes. The study by Armitage et al., (2020) used case study of 3 community representatives, convenient sampling, comparative and content analysis. However, the findings failed to reflect the context and settings of Kenyan communities. While both Danielle et al., (2022) and Armitage et al., (2020) used qualitative methodologies which limited inferencing, the study used descriptive survey in order to collect wide and in-depth data so as to provide detailed overview, description and explanation of how governance structures relate to biodiversity conservation in Lakipia County in Kenyan settings. Also, this

study used stratified random sampling to enhance representative of the findings on the influence of governance structures relate on biodiversity conservation.

Biodiversity conservation is empirically found to depend on governance type and quality Dawson et al. (2021) and community governance approaches (Feng et al, 2022). While the findings by Dawson et al. (2021) followed a systematic review of 169 research publications, factor and content analysis, descriptive statistics, Feng et al. (2022) used a survey of 80 national reserves using census of 357 households, structured questionnaires, factor analysis, hypothesis testing. Nevertheless, Dawson et al. (2021) failed to use clear research question, and test hypotheses as he depended on qualitative methodologies which increased biasness for generalizing the findings. Instead, this study integrated both qualitative and quantitative methods in order test hypothesis on influence of governance structures relate on biodiversity conservation in Laikipia County in Kenyan settings. The study based the findings on theories of stakeholder, change and sustainability.

In India, Alexander et al. (2022) investigated how indigenous governance structures affected ecosystem conservation whereby longitudinal survey, 11 respondents, interviews and observations and content analysis were used. It was found that community governance structures and systems were essential in strengthening management of ecosystem services. But 11 respondents were too few for conclusive findings. Reliance on qualitative methods of data collection and analysis limited inferencing of the findings Further, the concept of indigenous governances could not be generalized in Kenyan settings due to societal differences. This study adopted a larger sample size and incorporated both qualitative and quantitative methods to enhance the reliability and generalizability of the findings.

Mbuvi et al. (2022) did a related study focusing on governance and forest structure in Kakamega and Loita Forests in Kenya whereby qualitative design, observation and focused group discussion, documentary analysis and content analysis were used. It was found that participatory governance contributed to better forest management and improved community livelihoods. But Mbuvi et al. (2022) reliance on qualitative approaches lowered validity of the findings. contextual limitations to Kakamega County. These limitations were overcome by mixing qualitative and quantitative

methods to investigate how governance structures relate to biodiversity conservation in Laikipia County in Kenyan settings. Both qualitative and quantitative methods of data collection and analyses were used so as to improve generalizability of the findings.

### **2.2.2 Decision-making Approaches and Biodiversity Conservation**

Inclusive and systematic involvement in decision-making increases social acceptability of biodiversity conservation (Fortnam, et al., 2023). van Dijk et al. (2023) aver that all-inclusive participatory process of decision -making ensures long-term transformative change in biodiversity conservation. Similarly, participatory decision making is claimed to sway the biodiversity conservation efforts. This was revealed from the findings by Virk et al. (2023) while exploring decision-making process and biodiversity conservation in England whereby survey research design was adopted, convenient sample of 36 conservation professionals and semi-structured interviews. Descriptive analysis revealed that decision types and decision makers influenced effectiveness of biodiversity conservation efforts. However, the reliance on a small, non-random sample and descriptive statistics limited the generalizability and analytical depth of their findings. Instead, this study employed a mixed-methods approach with a larger, systematically selected sample to enhance both the robustness and applicability of the results.

Newig et al. (2023) carried out a study on stakeholder participation improvement of environmental conservation in Germany and found that participatory decision-making improves environmental outputs. Newig et al. (2023) relied on meta-analysis of 305 individual cases, content and descriptive analysis which lowered the validity for concluding and inferencing the findings. Similarly, Virk et al. (2023) reliance on qualitative methods and a small sample size of 36 eroded the validity of the results. Furthermore, the findings by Virk et al. (2023) and Newig et al. (2023) faced limited generalization to England and Germany settings respectively. This study integrated qualitative and quantitative methods data collection and analysis and used a large sample size when evaluating the influence of decision-making approaches on biodiversity conservation in Laikipia County in Kenyan settings.

Effective community participation in decision making is also found to enhance conservation effectiveness in Germany (Huber et al., 2023). Huber et al (2023) were evaluating community participation in protected area governance in Germany whereby meta-analysis of purposively sampled 52 empirical case studies was used and data was analysed through documentary and content analysis. But reliance on secondary data and qualitative methods eroded the validity for inferring the results. Additionally, there was no testing of hypothesis and pilot-testing of instruments. Instead, this study relied on primary data, incorporated both qualitative and quantitative methods, conducted pilot-testing to ensure validity, reliability and stronger inferential power in assessing the relationship between community participation and biodiversity conservation outcomes in Laikipia County.

In Kenya, active participation of local communities in all decision-making processes is empirically found to promote sustainable biodiversity conservation efforts (Kiria and Onundo, 2022). The study by Kiria and Onundo (2022) used case study design, simple random sampling of 68 respondents, questionnaires and interviews and descriptive analysis. Nevertheless, purposive sampling and descriptive statistics limited inferencing. Lack of pilot-testing of data collection instruments and use of case study design lowered validity and reliability of the findings. The conceptualization of decision making was too broad. Failure to test hypothesis limited development of reliable theories for advancing knowledge. Instead, the research used stratified random sampling, descriptive and inferential statistics for greater validity and generalization of the findings. The study triangulated qualitative and quantitative methods while testing the hypothesis. Instruments were pilot-tested to enhance validity and reliability of the findings on the influence of decision-making approaches on biodiversity conservation in Laikipia County. This study focused on a narrower and elaborate concept of decision-making in Kenyan settings.

### **2.2.3 Community Land Registration Process and Biodiversity Conservation**

A study to examine land registration process and biodiversity conservation was carried out by Katusiime and Schutt (2020) using meta-analysis, qualitative design, purpose sampling of published work, documentary, and content analysis. It was found that land tenure and registration influences biodiversity conservation as it affects acquisition, ownership, security, access and use. But reliance on secondary source of

data and qualitative methodology lowered the validity for generalizing the results. The finding was very broad and failed to explain the phenomenon in the context of community and registration process. Instead, this study used integrate both qualitative and quantitative methods of data collection and analysis in order to explain the influence of land registration process and biodiversity conservation in Laikipia County. In overcoming these limitations, this study integrated both qualitative and quantitative methods of data collection and analysis to provide a more comprehensive understanding of how the land registration process influences biodiversity conservation in Laikipia County.

In Sweden, Lofroth et al. (2023) explored land sharing and sparing and its effects on biodiversity conservation wher it was found that land registration affected ownership, land sharing, land sparing and conservation outcomes. While Lofroth et al. (2023) relied on survey, online questionnaires, 45 purposively sampled organizations and descriptive analysis, the concept of land registration was narrowly explored and the findings were not anchored on any theory. The finding had limited generalization to Sweden settings. Instead, this study used elaborate indicators of land registration process to examine its effects on biodiversity conservation in Laikipia Couty in Kenyan settings. In addition, the findings were based on theories of stakeholder, change and sustainability. The limitations were overcome by this study through the use of detailed and context-specific indicators of the land registration process to assess its influence on biodiversity conservation in Laikipia County, Kenya. In addition, the study was grounded in stakeholder theory, change theory and sustainability theory, which provided a strong conceptual foundation for interpreting the findings.

In Kenya, Schurmann et al. (2020) did a study on land tenure and land cover changes around at Arabuko Sokoke Forest whereby longitudinal survey, a random sample size of 334, interviews and questionnaires, Spearman's Rank correlational analysis and chi-squared test were used. It was revealed that the right to transfer ownership or the size of a property has no significant impact trees cover. But reliance on qualitative designs and non-parametric tests limited inferencing of the findings. Failure to pilot-testing of instruments lowered reliability and validity of the findings. The limitations were overcome by adopting a more robust methodological approach in this study,

which included the use of both parametric and non-parametric tests to improve inferential accuracy, pilot-testing of data collection instruments to enhance validity and reliability, and the integration of both qualitative and quantitative designs.

A study by Sang et al. (2023) when exploring the factors driving land cover transitions and land degradation in Isiolo County that no significant link existed between land ownership and degradation of environment. But Sang et al. (2023) relied on survey, observation guide, 200 randomly selected cases for observation, descriptive statistics and simulation. Failure to support the findings with existing theories eroded construct validity. This study relied on parametric tests like Pearsons's correlation and regression analysis and f-tests, conduct pilot-testing of instruments and use theory of change, stakeholder theory and sustainability theory to support the findings. Specifically, this study integrated qualitative and quantitative methods for increased validity in concluding the effects of land registration process on biodiversity conservation in Laikipia County in Kenya.

#### **2.2.4 Eenforcement of Structures and Biodiversity Conservation**

In China, biodiversity conservation of mammal diversity is empirically found not to related with law enforcement (Chen et al., 2019). Chen et al. (2019) was evaluating how law enforcement related to mammal diversity in a biodiversity hotspot in China whereby descriptive survey, simple random sampling of 374 community members, structured questionnaires and observation, descriptive, correlational and regression analysis were used. Nevertheless, the concept of law enforcement was so broad and failed to reflect the contextual characteristics across different geographical settings. The research gaps were overcome through a more refined and context-specific conceptualization of law enforcement in this study, which accounted for institutional structures, community perceptions and enforcement mechanisms unique to the Kenyan context. Additionally, this study employed a mixed-methods approach, used contextually validated instruments, and stratified sampling techniques to enhance representativeness.

Atuo et al. (2020) did a study to explore the link between law enforcement and community regulation and biodiversity conservation in Nigeria and found that community-level sanctions and sanctions played important roles that fear of arrest by

rangers in influencing behaviors and compliance in conservation efforts. Atuo et al. (2020) used survey, a sample size of 334 villagers, simple random sampling, semi-structured questionnaires, descriptive statistics, regression analysis and ANOVA. Nevertheless, the generalization of the findings by Chen et al., (2019) and Atuo et al. (2020) could not be generalized in Kenyan settings due to contextual and sociodemographic differences. The study used a narrower concept and definition of law enforcement structures and carried out the study in Kenya settings.

In Ethiopia, Gulte et al. (2023) did a survey focusing on the local communities' commitment on protected areas in Bale Mountains National Park whereby descriptive survey, multistage sampling of 379 respondents, key informant interviews, focused group discussion, factor analysis, inferential and regression analysis were used. The study revealed that community-built enforcement mechanisms provide incentives for the local people to participate, own and commit their efforts in conserving biodiversity. While neither pilot-testing of instruments nor hypothesis was tested, the findings were not anchored on any theory and the generalization of findings was limited to Ethiopian settings. This study pilot-tested instruments for validity and reliability, anchored the study on stakeholder theory, theory of change and sustainability theory and tested hypothesis on effects of enforcement structures on biodiversity conservation in Laikipia County in Kenya settings.

In Kenya, Chepkonga et al. (2022) did research exploring on community forest associations and sustainable forest utilization in North Nandi whereby mixed research design, simple random sampling of 156 respondents, questionnaires and focus group discussion and descriptive statistics were used. It was found that joint enforcement of forest management while involving indigenous people enhances sustainable utilization of forest resources. But reliance on descriptive statistics limited inferencing of the findings. findings were contextually limited to Nandi North. This study overcame the limitation by integrating both descriptive and inferential analytical methods so as to generate generalizable findings on the effects of enforcement structures on biodiversity conservation in Kenya settings.

## **2.3 Theoretical Framework**

The following theoretical framework anchors the study: stakeholder theory, theory of management of common pool resources and sustainability theory.

### **2.3.1 Stakeholder Theory**

Stakeholder theory was proposed by Freeman Edward in 1980s to emphasize on the recognition of concerns of peoples interested or affected by development discourse to enhance effectiveness of the interventions. It states that participatory decision-making is imperative in understanding and integrating the needs, expectations and interests of stakeholders and shareholders increases chance of attaining organizational success and sustainability (Freeman et al., 2010). Stakeholder theory is based on the principle of multiple stakeholder recognition and balancing stakeholder interests while eliminating conflicting interests and focus on the long-term value creation (Van & Harry, 2016). This theory assumes that value is created after consideration of the interdependent and interconnected needs of all players. stakeholder group can impact others and, ultimately, the overall success of the organization. Thus, any undertakings should consider ethical stances of all parties and implications of their actions on the wellbeing of the endeavors at hand. This study has reliably been applied with lots of certainty in numerous fields including but not limited to corporate governance and community social responsibility. In this study, stakeholder theory was the founding theoretical basis for recognizing the diverse interests and perspectives of stakeholders involved in community land management to persuade biodiversity conservation in Laikipia County. It was assumed that promotion of collaboration, inclusivity and sustainable land management practices would benefit of both ecosystems and human communities.

### **2.3.2 Theory of Management of Common Pool Resources**

Theory of management of common pool resources was developed by Elinor Ostrom in 1960s to challenge degradation, overuse and unsustainable management of common resources arising from isolation of communities in the management. Ostrom's theory states that successful management of common pool resources relies on the presence of specific design principles within the governing institutions and communities (Ali & Kamraju, 2023). These design principles include clear boundaries defining the resource and its users, mechanisms for collective decision-making and rule

enforcement, monitoring of resource usage, graduated sanctions for rule violations, mechanisms for conflict resolution, and the presence of local autonomy in decision-making. Her theory assumes that individuals within communities are heterogeneous, possessing diverse preferences, knowledge, and capabilities. However, it also assumes that under the right conditions, individuals can overcome collective action problems and cooperate to manage resources sustainably. Applications of Ostrom's theory can be found across various contexts, including agriculture, irrigation systems, grazing lands and forest conservation, her work has influenced policy-making and institutional design efforts aimed at promoting sustainable resource management worldwide. This theory provided a profound framework for understanding how community engagement in the utilization of their land resources can strategically add value to the attainment of stable biodiversity conservation in Laikipia County.

### **2.3.3 Sustainability Theory**

Developed by Meadows Donella in 1970s, sustainability theory aimed to advocate to practices and principles that enhance long-term well-being of live while promoting preservation and responsible use of natural resources for the benefit of present and upcoming generations. It thus states that the wellbeing of current and future generations depends on the practices and actions of the prevailing generation (Zhu, 2019). Sustainability theory is anchored on the principle of environmental responsibility, social inclusivity and equity and economic viability. This theory is built on the assumption of system thinking and understanding the relationships and dynamics a community is crucial for addressing sustainability challenges (Meehan & John, 2019). Sustainability theory is useful in policy integration by embedding sustainability principles into local policies, regulations and governance structures to ensure long-term commitment and support. Also, it is useful in creating sustainable collaborations and continuous learning and adaptations. This study views integration of sustainability principles into community land management as useful in achieving sustainable biodiversity conservation efforts in Laikipia County.

## 2.4 Conceptual Framework

The relationship between the study variables is illustrated in Figure 1

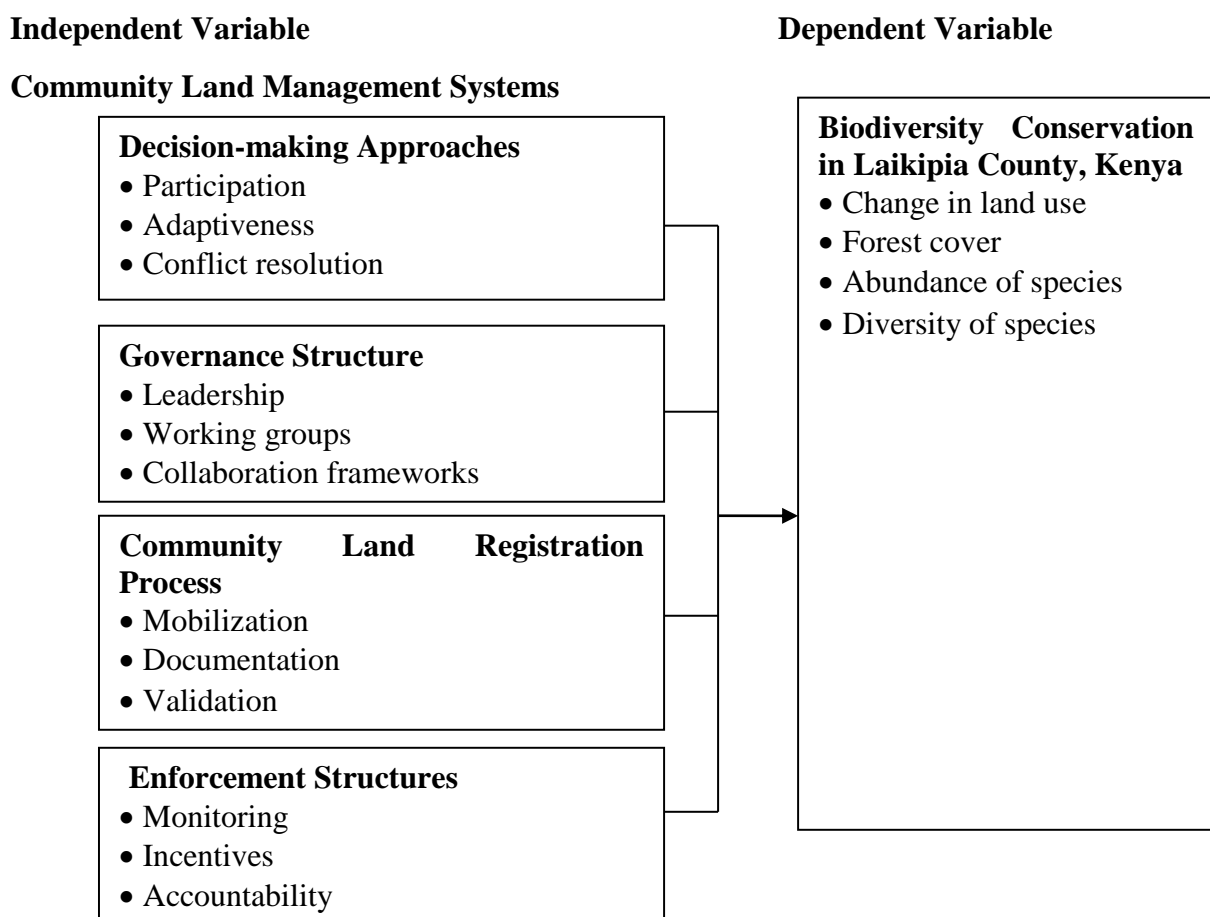


Figure 2.1: Conceptual framework (Researcher, 2024)

## 2.5 Summary of the Knowledge-gaps

The review of literature identified knowledge gaps which are summarized in Table 2.1

Table 2.1: Summary of Knowledge Gaps

Authors	Variables	Methodology	Main Findings	Gap	Study Focus
Danielle et al., (2022)	Governance structures and biodiversity conservation	Exploratory study, case study, purposive sampling of 158 cases, qualitative methodologies	Governance through structured controls, leadership promotes inclusive responsibility	The finding was so exploratory and failed to explain and predict the future state situation, case	To use descriptive survey in order to collect wide and in-depth data so as to provide detailed overview, description and

		in data collection and analysis,	in solving environmental challenges	study approach limited inferencing	explanation of how governance structures relate to biodiversity conservation in Laikipia County in Kenyan
Armitage et al., (2020)	Governance principles and biodiversity conservation	Case studies of 3 communities, convenient sampling, comparative and content analysis,	Community-centered conservation governance promotes equity rights approach leading to effective outcomes	Non-probability sampling lowered inferencing; findings did not reflect settings of Kenyan communities	To use stratified random sampling in order to enhance representative of the findings on the influence of governance structures relate on biodiversity conservation in Laikipia County in Kenya
Dawson et al (2021)	Role of indigenous communities in effective and equitable conservation	Systematic review of 169 research publications, factor and content analysis, descriptive statistics	Governance type and quality affects solutions that reinforce the role and capacity for conservation	No clear research question and test of hypotheses, qualitative methodologies increased biasness	To integrate both qualitative and quantitative methods in order test hypothesis on influence of governance structures relate on biodiversity conservation in Laikipia County in Kenyan settings
Feng et al (2022)	Community Governance and national park development in China	Survey of 80 national reserves using census of 357 households, structured questionnaires, factor analysis, hypothesis testing	Community governance impacted positively on residents' willingness to participate conservation	The findings reflected Chinese settings; the findings were not anchored on any theoretical basis.	To base the findings on stakeholder theory, theory of change and sustainability theory. To focus on governance structures, relate on biodiversity conservation in Laikipia County in Kenyan settings
Alexander et al. (2022)	Indigenous governance	Longitudinal survey, 11 respondents,	Community governance structures and	11 respondents were too few. Limited	To examine the concept of community

	ce structures ecosystem conservation in the Indian	interviews and observations, content analysis	systems for strengthened management of ecosystem services	generalization. Reliance on qualitative methods of data collection and analysis limited inferencing of the findings.	governances in Kenyan settings. To use both qualitative and quantitative methods of data collection and analyses so as to improve generalizability of the findings.
Mbuvi, Kungu and Eshitera(2022)	Governance and forest structure in Kakamega and Loita Forests in Kenya	Qualitative design, observation, focused group discussion, documentary analysis, content analysis	Participatory governance contributed to better forest management and improved community livelihoods	Qualitative approaches lowered validity of the findings. contextual limitations to Kakamega County	To mix qualitative and quantitative methods while investigating how governance structures, relate to biodiversity conservation in Laikipia County in Kenyan settings
Virk et al. (2023)	Decision-making process and biodiversity conservation in England	Survey, 36 conservation professionals, semi-structured interviews, descriptive analysis	Decision types and decision makers influenced effectiveness of biodiversity conservation efforts	Relied on qualitative methods, use a small sample size of 36, the findings did not reflect the Kenyan setting	To integrate both qualitative and quantitative methods data collection and analysis, to use large sample size when evaluating the influence of decision-making approaches on biodiversity conservation in Laikipia County in Kenya.
Newig et al. (2023)	Stakeholder participation and environmental conservation in Germany	Case-study, meta-analysis of 305 individual cases, content and descriptive analysis	Participatory decision-making improves environmental outputs.	Case study and qualitative design lowered validity for concluding and generalizing the findings	To use descriptive survey, mixed methods while investigating how decision-making relate to biodiversity conservation in Laikipia County in Kenyan settings
Huber,	Participat	Meta-analysis	Effective	Relied on	To collect raw

Newig and Loos (2023)	ion in protected area governance in Germany	of purposively sampled 52 empirical case studies, documentary analysis, qualitative and content analysis	participatory conservation increases effectiveness of biodiversity conservation efforts	secondary data and qualitative methods which eroded validity for inferencing the results. There no testing of hypothesis	data from respondents using structured and unstructured questions and test the hypothesis on the relationship between decision-making approaches and biodiversity conservation in Laikipia County in Kenya.
Ozuruoke et al. (2023)	Challenges of community participation in natural resource management in Nigeria	Descriptive survey, census of 383 households, structured questionnaires, descriptive analysis	Inadequate community participation in decision-making affects negatively the sustainability of conservation efforts	The generalization of the findings was limited to Nigeria settings. Failed to use inferential statistics. No pilot-testing and testing of hypothesis	To use F-test, inferential statistics and test hypothesis on the influence of decision-making approaches on biodiversity conservation in Laikipia County in Kenya.
Ahmed et al. (2023)	Decision-making processes and sustainable mangrove management in Lamu, Kenya	Correlational design, target population 296 respondents, purposive sampling, questionnaires and interviews, descriptive statistical technique	Active participation in all decision-making processes leads to sustainable management of mangroves	Purposive Sampling and descriptive statistics limited inferencing. No pilot-testing of data collection instruments.	To use stratified random sampling, descriptive and inferential statistics for greater validity and generalization of the findings. To pilot-test the instruments for validity and reliability
Kiria and Onundo (2022)	Sustainable decision-making and conservation of forest in Tharaka Nithi County in Kenya	Case study, simple random sampling of 68 respondents, questionnaires and interviews, descriptive analysis	Involvement of the local community in conservation decision led to sustainable impacts	Conceptualization of decision making was too broad and failed to test hypothesis. The case study design limited inferencing of the findings.	To use narrower and elaborate concept of decision-making, mixed methods, test hypothesis on the influence of decision-making approaches on biodiversity conservation in Laikipia County

Katusiime and Schutt (2020)	Land registration process and biodiversity conservation	Meta-analysis, qualitative design, purpose sampling of published work, documentary and content analysis	Land registration influences biodiversity conservation as it affects acquisition, ownership, security, access and use	Reliance on secondary source of data and qualitative methodology lowered the validity for generalizing the results.	To use integrate both qualitative and quantitative methods of data collection and analysis in order to explain the influence of land registration process and biodiversity conservation in Laikipia County
Lofroth et al. (2023)	Land sharing and sparing and biodiversity conservation in Sweden	Survey, online questionnaires, 45 purposively sampled organizations, descriptive analysis	Land registration affected ownership, land sharing and conservation outcomes	Land registration concept was narrowly explored, no theory used, finding had limited generalization to Sweden	Use elaborate indicators, examine its effects on biodiversity conservation in Laikipia County in Kenyan settings. To discuss the findings based on stakeholder theory, theory of change and sustainability theory.
Schurmann et al. (2020)	Land tenure and land cover changes around Arabuko Sokoke Forest in Kenya	Longitudinal survey, 334 random sample size, interviews and questionnaires spearman's Rank correlational, chi-squared test	Right to transfer ownership or the size of a property has no significant impact trees cover	Relied on non-parametric tests. No pilot-testing of instruments and the findings were not supported by ant theoretical framework.	To rely on parametric tests like Pearson's correlation and regression analysis and f-tests, conduct pilot-testing of instruments and use theory of change, stakeholder theory and sustainability theory to support the findings.
Sang et al. (2023)	Factors of land cover transitions and land	Survey, observation guide, 200 randomly selected cases for	No significant link between land ownership and	Qualitative methods limited inferencing. Conceptualization of land	To integrate qualitative and quantitative methods of data collection and analysis to

	degradation in Isiolo County, Kenya	observation, descriptive statistics and simulation	degradation of environment	registration was not clear relative to conservation efforts	increased validity for concluding the effects of land registration process on biodiversity conservation in Laikipia County Kenya
Chen et al. (2019)	Law enforcement and mammal diversity in a biodiversity hotspot in China	Descriptive survey, simple random sampling of 374, structured questionnaire, observation, descriptive, correlational, regressions	No significant link between community law enforcement and increased mammal abundance and diversity	Concept of law enforcement was so broad and failed to reflect the contextual characteristics across different settings	Narrower concept and definition of law enforcement structures in order to examine and test hypothesis on the effects of enforcement structures on biodiversity conservation in Laikipia County in Kenya
Atuo et al. (2020)	Law enforcement and community regulation and biodiversity conservation in Nigeria	Survey, 334 villagers, simple random sampling, semi-structured questionnaires, descriptive statistics, regression analysis ANOVA,	Community sanctions played important roles that fear of arrest by rangers in influencing behaviors and compliance in conservation efforts	The findings only reflected the situation in Nigerian settings.	To study the effects of enforcement structures on biodiversity conservation in Laikipia County in Kenya settings
Gulte, Tadele, Amare and Mekuria (2023)	Local communities' commitment on protected areas in Bale Mountains National Park, Ethiopia	Descriptive survey, multistage sampling, 379 respondents, key informant interviews, focused group discussion, factor analysis, inferential and regression analysis	Community-built enforcement mechanisms provide incentives for the local people to participate, own and commit their efforts in conserving biodiversity	While neither pilot-testing of instruments nor hypothesis was tested, the findings were not anchored on any theory and the generalization of findings was limited to Ethiopian settings.	Pilot-test instruments, anchor the study on stakeholder theory, theory of change and sustainability theory and test hypothesis on effects of enforcement structures on biodiversity conservation in Laikipia County

Chepkonga et al. (2022)	Community forest association and sustainable forest utilization in North Nandi, Kenya.	Mixed research, simple random sampling of 156 respondents, questionnaires and focus group discussion, descriptive statistics	Joint enforcement and involving indigenous people enhance sustainable utilization of forest resources	Reliance on descriptive statistics limited inferencing of the findings. Findings were contextually limited to Nandi North	To integrate both descriptive and inferential analytical methods so as to generate generalizable findings on the effects of enforcement structures on biodiversity conservation in Laikipia County in Kenya settings
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Source (Author, 2023)

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 Introduction**

The chapter provides an overview of the methodology to be adopted in achieving the study's objectives. Firstly, the chosen research design and its rationale are explained. The study variables are elaborated followed by the description of the study site. The targeted population, sample size and sampling techniques are also discussed. This is followed by explanation about the research instruments and pilot-study to test validity and reliability. Data collection and analysis techniques are then explored and the logistics involved as well as the ethical considerations.

### **3.2 Research Design**

Descriptive survey research design was used to systematically collect, analyse, interpret, and explain information about community land management systems and their effects on sustainable conservation in Laikipia County. This design was appropriate as it allows for an extensive examination of present practice, attitude, and perception at the grassroots level under real conditions without having to manipulate variables. It allowed the researcher to gather a broad range of data from a diversity of individuals and hence identify trends and associations among land management systems and conservation outcomes. Through descriptive survey design, data was analysed through statistical methods descriptive statistics such as frequency, mean, percentages, standard deviation as well as inferential statistics which help to summarize and present data in a comprehensible manner and draw appropriate conclusions, predictions, and generalizations (Siedlecki, 2020). Cross-sectional approach to descriptive survey was used to collect data at a single point and in one time from diverse stakeholders to provide a snapshot of the prevailing characteristics of the variables of interest.

### **3.3 Variables/ Categories of Variables**

The dependent for the study was conservation of biodiversity in Laikipia County as was indicated by the change in land use, forest cover, abundance, and diversity of species. The main independent variable was community land management systems and its sub-variables are governance structure, decision-making approaches, community land registration process and enforcement structures. While the indicators

for governance structure are leadership, working groups and collaboration frameworks, the indicators for decision-making approaches are participation, adaptiveness and conflict resolutions. Community land registration was measured by mobilization, documentation, and validation. The indicators for enforcement structures were monitoring, incentives and accountability. These indicators were categorical in nature but was transformed into interval or quantitative sales using Statistical Packages for Social Sciences. The questions for each variable will be categorical in nature but through SPSS, the categorical data were transformed into continuous variable for parametric analysis. Table 3.1 summarizes the analysis of the variable and measures allocated.

**Table 3.1: Analysis of Variable**

<b>Category of Variable</b>	<b>Variable</b>	<b>Type of variable</b>	<b>Measures</b>
<b>Dependent</b> (Conservation of biodiversity)	Conservation of Biodiversity in Laikipia County	Categorical	<ul style="list-style-type: none"> <li>• Change in land use</li> <li>• Forest cover</li> <li>• Abundance of species</li> <li>• Diversity of species</li> </ul>
<b>Independent</b> (Community Land Management Systems)	Governance Structure	Categorical	<ul style="list-style-type: none"> <li>• Leadership</li> <li>• Working groups</li> <li>• Collaboration frameworks</li> </ul>
	Decision-making Approaches	Categorical	<ul style="list-style-type: none"> <li>• Participation</li> <li>• Adaptiveness</li> <li>• Conflict resolutions</li> </ul>
	Community Land Registration	Categorical	<ul style="list-style-type: none"> <li>• Mobilization</li> <li>• Documentation</li> <li>• Validation</li> </ul>
	Enforcement Structures	Categorical	<ul style="list-style-type: none"> <li>• Monitoring,</li> <li>• Incentives</li> <li>• Accountability</li> </ul>

Source (Researcher, 2023)

### **3.4 Location/ Site of the Study**

The research was carried out in Laikipia County in Kenya specifically within the community owned conservancies. As a cosmopolitan County, the headquarters of Laikipia is located at Rumuruti. The County has two major urban centres namely: Nanyuki to the southeast and Nyahururu to the southwest. The 6 neighbouring Counties to this county are Samburu, Isiolo, Meru, Nyeri, Nyandarua, Nakuru and Baringo. With a total population of 518,560 people, the main economic activities in

the county are tourism, ranching, agriculture of grain crops and greenhouse horticulture (KNBS, 2019). Laikipia County has 6 Sub-counties namely: Laikipia Central, Laikipia East, Laikipia North, Laikipia West, Nyahururu and Kirima. The Laikipia hosts 29 conservancies (KNBS, 2022). The study focused on different players and stakeholders in biodiversity conservation efforts in Laikipia County. They included community representatives who including landowners, conservancies, and Government agencies. The synergy among landowners, conservancies, government agencies and communities were crucial because each entity brings unique resources, perspectives, and responsibilities to the conservation efforts. Understanding the diverse perspectives and opinions from the community representatives, conservancies rangelands coordinators, conservancy managers and government agencies regarding community land management systems and its effects on biodiversity conservation is useful in tapping critical perspectives in developing inclusive and effective conservation strategies

### 3.5 Target Population

The targeted population was 2,035 consisting of 6 Ministry of Land and Environment Officers, 29 managers of community conservancy and 2,000 community land representatives in Laikipia County (KNBS, 2022; Munyeki, 2022). These entities played a crucial role in collaborative efforts for effective address of the complex challenges that biodiversity faces in Laikipia County. The target population is summarized Table 3.2.

**Table 3.2: Targeted Population in Laikipia County**

<b>Category</b>	<b>Number</b>
Environment and Land Officers	6
Managers of Conservancy	29
Community Land Representatives	2,000
<b>Total</b>	<b>2,035</b>

Source: (KNBS, 2022; Munyeki, 2022)

### 3.6 Sample Size and Sampling Techniques

The sample size of 327 was obtained through Krejcie and Morgan (1970) sample-determination table (See Appendices VII). Table 3.3 provides the distribution of the sample size. Table 3.3 presents sample size

**Table 3.3: Sample Size**

<b>Category</b>	<b>Number</b>
Environment and Land Officers	6
Managers of Conservancy	29
Community Land Representatives	292
<b>Total</b>	<b>327</b>

Source: (Researcher, 2023)

In the actual selection of respondents, the 6 environment and land officers as well as the 29 managers of conservancy were automatically part of the respondents due to their small population. The balance of 292 was selected from the community land representatives through proportionate stratified random sampling. Proportionate stratified random sampling eliminates biasness by ensuring that each member of the population has an equal chance of being selected in each stratum and this promotes generalizability of findings.

### **3.7 Sources of Data**

In answering the question on the influence of community land management systems on sustainable conservation in Laikipia County, this research relied on primary sources of data. Primary sources of data offer researcher with greater control over the data collection process to ensure quality, accuracy and reliability and ensure that the data directly meets the specific purpose of the research. Also, primary sources of data offer up-to-date and current information on the subject, and this is crucial in understanding and explaining the rapidly changing phenomena. The primary sources of data were collected using questionnaires, interviews and observations. Questionnaires were used to collect numerical data directly from the community land representatives about attitudes, opinions, behaviors, and perceptions on the subject matter. Interviews were used to gather detailed and privileged information by directly engaging with environment and land officers, and managers of conservancy firms in Laikipia County. Observation guide or direct observation included watching the status of biodiversity phenomena to provide firsthand data for supplementing the other data.

#### **3.7.1 Research Instruments**

The main data collection tool was structured questionnaires assuming 5-point Likert-scale. The scale ranged from 1 to 5 with each point representing level of agreement

from strongly disagree to strongly agree. The Likert-scale questionnaire aided collection of quantitative responses from the community land representatives on community and management system relative to biodiversity conservation in Laikipia County. The structured questionnaire was appropriate for collecting standardized quantitative data from a large sample of respondents in a time-efficient manner. It enabled the researcher to get uniform answers to community land management practice and its effects on biodiversity conservation, making statistical analysis and comparison more convenient across various groups. The questionnaires were created in a user-friendly and easy way to facilitate accurate self-administration by respondents (Appendix II). The questionnaire design had questions on sociodemographic aspects of the respondents and main questions reflecting the research variables.

Interview guide was used to collect textual and narrative data from the environment and land officers, and managers of community conservancies in Laikipia County. Interview had unstructured questions for a deeper exploration and probing of the interviewees' thoughts, experiences and perspectives on the linkage between community and management system relative to biodiversity conservation in Laikipia County (Appendix III). The interview guide was chosen for the purposes of eliciting qualitative depth, notably from informant populations like local authorities, government ministers, and conservationists. This tool permitted the explication of complex problems, probing individuals' private experience, and eliciting underlying motivating factors, attitudes, and frustrations that cannot be elicited from structured questionnaires. The unstructured interviews served as valuable supplements to numerical data that was gathered using structured questionnaire. The structure of the interview guide comprised of questions on sociodemographic characteristics of respondents and questions on the study variables.

Observation guide was adopted to record the current statuses of biodiversity conservation in Laikipia County. The information that was obtained from the observation procedure was used to supplement the data that was collected using interviews and questionnaires. The observation guide was applied directly to assess physical and behavioral land use, land management practice, and conservation activity characteristics in their natural setting. It provided first-hand, non-obtrusive

information that helped verify or triangulate data gathered through questionnaires and interviews, thereby reducing biases and enhancing the validity of findings. The observation guide outlined the specific details and parameters to observe in natural settings. These included change in land use, forest cover, abundance of species and diversity of species in the community land in Laikipia County (Appendix IV).

### **3.7.2 Pilot Testing**

Pilot-testing of the instruments was done in Laikipia County to a sample size of 33 respondents or 10% of the full study sample size as recommended by Menon et al. (2021). Respondents were of the same rank as the respondents for the actual study for each instrument was selected randomly. The instruments pilot-tested include structured questionnaires, interviews and observation guides. Pilot testing was useful in ensuring the reliability, validity, and effectiveness of research instruments. Those sample for pilot-testing were eliminated in the actual study to avoid sample contamination.

### **3.7.3 Validity**

Validity was ensured through matching of the constructs with the questions in the data collection instruments. This ensured that the instrument covers all aspects of the construct being measured. Also, data collection tools were subjected to expert`s inputs for further improvement.

### **3.7.4 Reliability**

The split-half method was used to assess the internal consistency of the measurement tools. This was achieved by randomly dividing the measurement tool into two equal halves and running the correlation between the two groups using Pearsons Correlation Method. The internal consistency and reliability of the measurement was affirmed when the value of the correlation coefficient exceeds Cronbach's alpha coefficient value of 0.7 as recommended by Taber (2018).

### **3.7.5 Reliability of Instruments**

The split-half method was employed to assess the reliability of the instrument. After administration and collection, the instruments were randomly divided into two halves and Pearson's correlation was used to evaluate the relationship between the two

halves. Table 3.4 presents the results of the reliability test. Table 4 shows the reliability test results.

**Table 3.4: Reliability Test Results**

<b>Variable</b>	<b>Cronbach's Alpha</b>
Governance Structure	0.80
Decision-making Approaches	0.77
Community Land Registration Process	0.75
Enforcement Structures	0.85

**Source: Research Data (2024)**

The data in Table 3.4 shows that governance structure, decision-making approaches, community land registration process and enforcement structures had 0.80, 0.77, 0.75 and 0.85 Cronbach's Alpha values respectively. The instruments were considered reliable as all correlation coefficients for each variable surpassed the 0.7 threshold for Cronbach's Alpha Coefficient (Saleeb et al., 2023). This indicates that the instruments produced stable and consistent results. The reliability ensured that the data collected were dependable and could be replicated under similar conditions

### **3.7.6 Data Collection Techniques**

Before data collection, clearance letter was acquired from the University and research permit from the National Council for Science Technology and Innovation (NACOSTI). Pilot-testing of the study instruments was then carried out in Laikipia County. Sampling list was then obtained from the KNBS office in Laikipia. Research assistants were recruited, trained and inducted to prevent variation in data collection and ethical adherence. The Laikipia County Office of the County Commissioner was approached to obtain official clearance and security support, thereby facilitating smooth interaction with community members. Good quality and up-to-date maps were utilized to guide field navigation and sampling by wards and ecological zones in the county. Data collection instruments were then administered after sampling. Approaches used to obtain the highest rate of response included pre-sensitization of community leaders and respondents, pre-informed consent, interviewing participants at their convenient hours, follow-up calls to non-respondents, and notification of participants about confidentiality and research objective of the study. These steps

helped in creating trust, reduced respondent fatigue, and encouraged fuller participation. The filled data collection tools were ascertained for completeness, analyzed and reported.

### 3.8 Data Analysis and Presentation

The first stage of data analysis entailed data cleaning to identify and rectify errors, missing values, outliers or inconsistencies in the dataset. For the quantitative data from the structured questionnaires, the second step involved transformation of categorical data into continuous variable data by allocation of five equidistance of 0.8 starting from 1.0 to 5.0. This involved the use of Statistical Packages for Social Sciences (SPSS Version 25). The following descriptive statistics were generated mean, percentages, frequencies, and standard deviation. Inferential statistics like correlation analysis was used to evaluate the relationships between variables using correlation coefficients. Hypotheses were tested using F-test at 95% confidence interval. Regression analysis was used to predict the outcomes.

$$Y_1 = \beta_0 + \beta_1 X_1 + \varepsilon \text{ -----Objective 1}$$

$$Y_2 = \beta_0 + \beta_2 X_2 + \varepsilon \text{ -----Objective 2}$$

$$Y_3 = \beta_0 + \beta_3 X_3 + \varepsilon \text{ -----Objective 3}$$

$$Y_4 = \beta_0 + \beta_4 X_4 + \varepsilon \text{ -----Objective 4}$$

$$Y_5 = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon \text{ -----Overall Objective}$$

Whereby,

$Y_{1,2,3,4,5}$  are the dependent variables with respect to each combination of variables.

$X_1, 2, 3, 4, 5$  are the independent variables (governance structure, decision-making approaches, community land registration and enforcement structures respectively),  $\beta_0$  is a constant and  $\beta_1, \beta_2, \beta_3, \beta_4$  and  $\beta_5$  are determination coefficients for  $X_1, 2, 3, 4, 5$  and  $\varepsilon$  is the term of error.

Qualitative data from the interviews and observation guide was analyzed through content analysis whereby data was categorized and coded into meaningful categories. The thematic analysis was carried out to identify themes or patterns. The findings were then interpreted, summarized and reported. Qualitative findings were used to supplement the descriptive and inferential findings.

### **3.9 Logistical and Ethical Considerations**

Before conducting the study, research goals and methodology as well as the expected outcomes was clearly spelt out. Adequate resources, for example time, finances, personnel, and equipment necessary for successful research study. Clearance letter and research permits was obtained from Kenyatta University and NACOSTI respectively. The researcher ensured compliance with all relevant laws, regulations and ethical guidelines governing research practices. Ethical and transparent methods for recruiting research assistants and participants was set. Research assistants were recruited and trained in research goals and ethical requirements. The researcher emphasized on informed consent from participants, explaining the research purpose, procedures, risks and rights. Participants` autonomy, privacy and dignity were respected throughout the research process. No one was subjected to risks or harm. Privacy and confidentiality of the research participants were safeguarded. The researcher upheld research integrity, avoiding fabrication, falsification or plagiarism. The data was reported and disseminated without false manipulations.

## CHAPTER FOUR: DATA ANALYSIS AND INTERPRETATIONS

### 4.1 Introduction

In this chapter, the data gathered through questionnaires and interviews to fulfill the study's objectives is analyzed, interpreted and discussed in relation to existing literature. While numerical data was evaluated using inferential and descriptive statistics, the narrative qualitative data was examined through content analysis. The study was guided by four independent variables (governance structures, decision-making approaches, community land registration process and enforcement structures) and the dependent variable (biodiversity conservation in Laikipia County, Kenya).

### 4.2 Questionnaire Response Rate

A total of 292 questionnaires were administered, with 221 being properly completed and returned. Out of the 35 planned interview, 18 were completed. The frequencies and percentages of the questionnaires and interviews are presented in Table 4.1

**Table 4.1: Response Rate**

<b>Instrument</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Questionnaire	Completed	220	75.3
	Uncompleted	72	24.7
	<b>Total</b>	<b>292</b>	<b>100.0</b>
Interviews	Completed	18	51.1
	Uncompleted	17	48.9
	<b>Total</b>	<b>35</b>	<b>100.0</b>

**Source: Research Data (2024)**

The data in Table 4.1 indicates a response rate for questionnaires and interviews were 75.3% and 51.1% respectively. The 75.3% response rate for questionnaires exceeded the minimum 70% rerun rate for conclusive survey findings (Holtom et al., 2022). Equally, the 51.1% response rate for interviews exceeded 50% minimum response rate for qualitative study (Sataloff & Vontela, 2021). Th high response rate was attributed to effective interpersonal skills during data collection. Additionally, the research team was persistent in following up and persuading respondents to complete the instruments.

### 4.3 General Information

The sociodemographic information regarding the gender and age of the respondents was analysed, and the results are presented underneath

#### 4.3.1 Gender

This study was interested in establishing the gender of the respondents to ensure inclusivity of different perspectives and avoid biasness. This promoted fairness and ensured that the study does not overlook important variations in responses. Gender of the respondents was indicated as either male or female. The frequencies and percentages for the gender distribution is presented in Table 4.2

**Table 4.2: Gender of Respondents**

<b>Gender</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Males	130	59.1%
Females	90	40.9%
<b>Total</b>		<b>100.0</b>

**Source: Research Data (2024)**

The data in Table 4.2 indicates that 130 (59.1%) of the questionnaire respondents were male, while 90(40.9%) were female. Among the interview respondents, 10 out of 18 (55.6%) were male, and 8 (44.4%) was female. This suggests a fair representation of both genders, which was crucial in ensuring balanced responses. Gender-balanced responses helped to safeguard the validity of the findings

#### 4.3.2 Age

This study was interested in establishing the age of the respondents to ensure that age-related differences in perspectives and experiences could be identified and analyzed. Age of the respondents was categorized in the following groups: 18-35years, 36-45 years, 46-55 years, 55-65 years and 66 years and above. The findings are in Table 4.3

**Table 4.3: Age of Respondents**

<b>Age-group(years)</b>	<b>Frequency</b>	<b>Percentage (%)</b>
18-35	101	45.9
36-45	63	28.7
46-55	46	20.9
56-65	10	4.5
66 and above	0	0.0
<b>Total</b>	<b>220</b>	<b>100.0</b>

**Source: Research Data (2024)**

The data in Table 4.3 shows that the frequency of the ages of the respondents for the questionnaires decreased as followed: between 18 and 35 years were 101 (45.9%), 36-45 years were 63(28.9%), 46-55 years were 46(20.9%) and 56-65 were 10(4.5%). All (100%) the respondents for the interviews aged between 36-50 years. This implies that the majority of participants, especially in the questionnaire group, were relatively younger, while the interview respondents were all within the mid-age range, suggesting that the sample captured a broad range of age groups, though with a concentration in the younger and middle-aged categories. This reflected diversity of opinions based on age leading to more valid outcomes.

#### **4.4 Descriptive Statistics**

The findings from the descriptive statistical analysis of the study's objective variables were determined and are summarized in the subsequent sections

##### **4.4.1 Biodiversity Conservation in Laikipia County, Kenya**

Biodiversity Conservation in Laikipia County, Kenya was the dependent variable whose indicators were: change in land use, forest cover, abundance of species and diversity of species. Ten statements were created from the indicators of youth employability and subjected to respondents. Ten statements were rated between 1 and 5 whereby: 1 represented Strongly Disagree, 2 represented Disagree, 3 represented None, 4 represented Agree and 5 represented Strongly Agree. Table 4.4 presents the descriptive findings; percentages are placed in the brackets.

**Table 4.4: Descriptive Data for Biodiversity Conservation in Laikipia County (n = 220)**

Items	1	2	3	4	5	Mean	SD
The County had experienced immense changes in land use	0(0.0)	3(1.4)	17(7.3)	128(58.2)	73(33.2)	4.23	0.64
There was rapid reduction in deforestation	0(0.0)	7(3.2)	11(5.0)	171(77.7)	31(14.1)	4.02	0.56
Sustainable land use practices like agroforestry had helped mitigate the negative effects on ecosystem	0(0.0)	0(0.0)	0(0.0)	187(85.5)	28(12.7)	4.11	0.37
Afforestation had promoted biodiversity conservation	0(0.0)	3(1.4)	15(6.8)	182(82.7)	20(9.1)	4.00	0.46
Community forest preservation had led to abundance of species	0(0.0)	7(3.2)	37(16.8)	167(75.9)	9(4.1)	3.81	0.55
Respondent had observed changes in the population sizes of wildlife species in my local area over the past few years.	0(0.0)	4(1.8)	17(7.7)	177(80.5)	22(10.0)	3.99	0.50
Selective logging had enhanced conserving biodiversity	1(0.5)	0(0.0)	26(11.8)	165(75.0)	28(12.7)	4.00	0.54
Balancing human needs with forest cover practices had increased diversity of species	0(0.0)	0(0.0)	19(8.6)	171(77.7)	30(13.6)	4.01	0.47
There was abundance of crops and animals in the locality	0(0.0)	1(0.5)	10(4.5)	178(80.9)	31(14.1)	4.09	0.45
Respondent fully supported measures to conserve threatened or endangered species	4(1.8)	6(2.7)	0(0.0)	48(21.8)	153(69.5)	3.72	0.67
<b>Combined</b>						<b>4.00</b>	<b>0.52</b>

**Source: Research Data (2024)**

Table 4.4 shows the descriptive statistics for the responses on the items describing biodiversity conservation in Laikipia County, Kenya. In the first item, 3(1.4%), 17(7.3%), 128(58.2%) and 73(33.2) respondents disagreed, neither agreed nor disagreed, agreed and strongly agreed that the County had experienced immense changes in land use respectively. This item had a mean score of 4.23 implying that majority of the respondents strongly agreed that the County had experienced immense changes in land use. The moderate standard deviation of 0.64 implied stability of the scores. The second item stated that there was rapid reduction in deforestation whereby 7(3.2%), 11(5.0%), 171(77.7%) and 31(14.1%) respondents disagreed, neither agreed nor disagreed, agreed and strongly agreed respectively. For the mean of 4.02, most of the respondents agreed with the item. The stability of opinions from respondents was

deemed stable since standard deviation was moderate (0.56). In the third item, 187(85.5%) respondents agreed and 28(12.7%) respondents strongly agreed that sustainable land use practices like agroforestry had helped mitigate the negative effects on ecosystem whereby respectively. The mean of 4.11 implied that majority of the respondents were in strong agreement with the item and their opinions had low variations as indicated by the standard deviation of 0.37. The next item stated that afforestation had promoted biodiversity conservation and the response was as follows: 3(1.4%), 15(6.8%), 182(82.7%) and 20(9.1%) respondents disagreed, neither agreed nor disagreed, agreed and strongly agreed respectively. The mean of 4.00 implied that most of the respondents were in agreement with the statement that afforestation had promoted biodiversity conservation and their opinions were stable for standard deviation of 0.46. In the fifth statement, 7(3.2%) respondents disagreed, 37(16.8%) respondents were neutral, 167(75.9%) respondents agreed and 9(4.1%) strongly agreed that community forest preservation had led to abundance of species. However, most of the respondents were in agreement that community forest preservation had led to abundance of species (mean = 3.81) and their opinions were valid as indicated by low variation of scores around the mean (moderate standard deviation = 0.55).

In the sixth statement, it was stated that the respondent had observed changes in the population sizes of wildlife species in my local area over the past few years whereby: 4(1.8%), 17(7.7%), 177(80.5%) and 22(10.0%) respondents disagreed, neither agreed nor disagreed, agreed and strongly agreed respectively. But most of the respondents were in agreement that they had observed changes in the population sizes of wildlife species in my local area over the past few years (mean = 3.99). The moderate standard deviation value of 0.50 indicated steadiness of this rating. In the next item, 1(0.5%) respondent strongly disagreed, 26(11.8%) respondents were neutral, 165(75.0%) respondents agreed and 28(12.7%) respondents strongly agreed that selective logging had enhanced conserving biodiversity respectively. For the mean of 4.00, majority of the respondents strongly agreed that selective logging had enhanced conserving biodiversity and the rating was deemed stable for the moderate standard deviation of 0.54. The eighth item stated that balancing human needs with forest cover practices had increased diversity of species whereby: 19(8.6%), 171(77.7%) and 30(13.6%) respondents neither agreed nor disagreed, agreed and strongly agreed respectively. The mean on 4.01 indicate that most of the respondents strongly agreed that balancing

human needs with forest cover practices had increased diversity of species. The standard deviation of 0.47 meant that the ratings was valid since the variation of the opinions around the mean was low. The next item stated that there was abundance of crops and animals in the locality whereby: 10(4.5%), 178(80.9%) and 31(14.1%) of the respondents agreed nor disagreed, agreed and strongly agreed respectively. Most of the respondents agreed that there was abundance of crops and animals in the locality for the mean of 4.09 and the standard deviation of 0.45 implied data stability. In the last item, 4(1.8%) respondents strongly agreed, 6(2.7%) respondents disagreed, 48(21.8%) respondents agreed and 153(69.5%) respondents were in strong agreement that they fully supported measures to conserve threatened or endangered species. This statement scored a mean of 3.72 implying that majority of the respondents were positive and agreed with the statement. The opinions of the respondents were deemed stable for the moderate standard deviation of 0.67.

The overall mean score for the items describing biodiversity conservation in Laikipia County, Kenya was 4.00 implying that majority of the respondents were positive and on the affirmative on the scores of the 10 items describing the phenomenon. This finding was supported by the moderate standard deviation of 0.52, indicating a relatively low variability in the opinions of the respondents.

#### **4.4.2 Governance Structures and Biodiversity Conservation in Laikipia County**

The study sought to assess the effects of governance structures on biodiversity conservation in Laikipia County, Kenya. This was important because governance structures play a critical role in shaping conservation policies, resource management, and enforcement mechanisms, which directly impact the effectiveness of biodiversity protection efforts. Governance structure was the first independent variable whose indicators included: leadership, working groups and collaboration frameworks. Respondents rated seven statements in the scale whereby: 1 represented Strongly Disagree, 2 represented Disagree, 3 represented None, 4 represented Agree and 5 represented Strongly Agree. Table 4.5 presents the descriptive data. The data in the brackets are percentages.

**Table 4.5: Descriptive Data for Governance Structures and Biodiversity Conservation in Laikipia County (n = 220)**

Items	1	2	3	4	5	Mean	SD
Community leadership ensured success of biodiversity conservation	1(0.5)	2(0.9)	13(5.9)	180(81.7)	24(10.9)	4.02	0.50
Community leadership mobilized community member in biodiversity conservation efforts	0(0.0)	0(0.0)	9(4.1)	174(79.1)	37(16.8)	4.13	0.44
Community leaders engaged members to participate actively in conservation projects	0(0.0)	0(0.0)	24(10.9)	167(75.9)	29(13.2)	4.02	0.49
Community leaders ensured strong collaboration with external stakeholders in biodiversity conservation efforts	1(0.5)	0(0.0)	26(11.8)	165(75.0)	28(12.7)	4.00	0.54
There were working groups coordinated in promoting biodiversity conservation	0(0.0)	0(0.0)	19(8.6)	171(77.7)	30(13.6)	4.05	0.47
There was networking framework in biodiversity conservation	0(0.0)	1(0.5)	10(4.5)	178(80.9)	31(14.1)	4.09	0.45
Leadership styles were most effective in fostering collaborative biodiversity conservation	1(0.5)	3(1.4)	27(12.3)	166(75.5)	23(10.5)	3.94	0.57
<b>Combined</b>						<b>4.04</b>	<b>0.49</b>

**Source: Research Data (2024)**

The descriptives data shown in Table 4.5 shows the statistics for the responses on the items describing governance structure and biodiversity conservation in Laikipia County, Kenya. In response to the first item, 1(0.5%) respondent strongly agreed, 2(0.9%) respondents disagreed, 13(5.9%) respondents were neutral, 180(81.7%) respondents agreed and 24(10.9%) respondents strongly agreed that community leadership ensured success of biodiversity conservation. For the mean of 4.02, majority of the respondents strongly agreed that community leadership ensured success of biodiversity conservation. With standard deviation of 0.50, the responses had low variation of scores about the mean implying data stability. The next item was answered as follows: 9(4.1%), 74(79.1%) and 37(16.8%) respondents neither agreed nor disagreed, agreed and strongly agreed that community leadership mobilized community member in biodiversity conservation efforts respectively. The mean score of 4.13 implied that most of the respondents were in strong agreement with the item. The opinions of the respondents had little variations around the mean since the standard deviation was low (0.44).

The third item stated that community leaders engaged members to participate actively in conservation projects whereby: 24(10.9%), 167(75.9%) and 29(13.2%) respondents were neutral, in agreement and in strong agreement that community leaders engaged members to participate actively in conservation projects respectively. The mean of 4.02 implied that majority of the respondents agreed with the item. The stability of opinions from respondents was deemed stable since standard deviation was moderate (0.54). In the fourth item, 26(11.8%) respondents were neutral, 165(75.0%) respondents agreed while 28(12.7%) respondents strongly agreed that community leaders ensured strong collaboration with external stakeholders in biodiversity conservation efforts. The of 4.00 indicated that majority of the respondents strongly agreed that community leaders ensured strong collaboration with external stakeholders in biodiversity conservation efforts and their opinions had low variations as indicated by the moderate standard deviation of 0.54.

The next item stated that there were working groups coordinated in promoting biodiversity conservation whereby response was as follows: 19(8.6%), 171(77.7%) and 30(13.6%) respondents neither agreed nor disagreed, agreed and strongly agreed respectively. The mean of 4.05 implied that most of the respondents were in agreement with the statement. There was low variation of scores about the mean since standard deviation of 0.47. In the sixth statement, 1(0.05%) respondent disagreed, 10(4.5%) respondents were neutral, 178(80.9%) respondents agreed and 31(14.1%) respondents strongly agreed that there was networking framework in biodiversity conservation. However, most of the respondents were in strong agreement that there was networking framework in biodiversity conservation (mean = 4.09) and their opinions were deemed valid as indicated by low variation of scores around the mean (standard deviation = 0.45). The last statement stated that leadership styles were most effective in fostering collaborative biodiversity conservation whereby: 1(0.5%), 3(1.4%), 27(12.3%), 166(75.5) and 23(10.5%) respondents strongly disagreed, disagreed, neither agreed nor disagreed, agreed and strongly agreed with the statement respectively. But, most of the respondents were in agreement that leadership styles were most effective in fostering collaborative biodiversity conservation. The moderate standard deviation value of 0.57 indicated steadiness of this rating.

The overall rating for governance structure and biodiversity conservation in Laikipia County, Kenya showed that for the overall mean of 4.04, majority of the respondents strongly agreed that governance structure contributed to the biodiversity conservation in Laikipia County, Kenya. This finding was reliable since the variation about the mean was relatively low as indicated by the standard deviation of 0.49.

#### 4.4.3 Decision-making Approaches and Biodiversity Conservation in Laikipia County

This study sought to establish the effects of decision-making approaches on biodiversity conservation in Laikipia County, Kenya. This was important because effective decision-making can lead to more sustainable management of biodiversity, while poor approaches may hinder conservation efforts. Decision-making approach another independent variable whose indicators were: participation, adaptiveness and conflict resolution. Respondents rated eight statements in the scale whereby: 1 represented Strongly Disagree, 2 represented Disagree, 3 represented None, 4 represented Agree and 5 represented Strongly Agree. Table 4.6 presents the descriptive data. In brackets are percentages.

**Table 4.6: Descriptive Data for Decision-making Approaches and Biodiversity Conservation in Laikipia County (n = 220)**

Items	1	2	3	4	5	Mean	SD
Land use decisions were made in participatory manner	18(8.2)	23(10.5)	32(14.5)	134(60.9)	13(15.9)	3.46	1.03
Decision-making was engaging	0(0.0)	2(0.9)	13(5.9)	127(57.7)	78(35.5)	4.28	0.61
Decisions were adaptive	0(0.0)	7(3.2)	11(5.0)	169(76.8)	33(15.0)	4.04	0.57
Conflicts were effectively solved	0(0.0)	0(0.0)	5(2.3)	185(84.1)	30(13.6)	4.11	0.38
All community interests were factored in shaping land use decisions that impact biodiversity	0(0.0)	3(1.4)	14(6.4)	184(83.6)	19(8.6)	4.00	0.45
Community knowledge about biodiversity was factored in land use decision-making processes	0(0.0)	7(3.2)	36(16.4)	168(76.4)	9(4.1)	3.81	0.55
Community capacity, land use choices and biodiversity conservation were factored in decision-making	0(0.0)	4(1.8)	17(7.7)	177(80.5)	22(10.0)	3.99	0.50
There was continuous learning on community land use decisions	0(0.0)	0(0.0)	12(5.5)	171(78.2)	36(16.4)	4.11	0.46
<b>Combined</b>						<b>3.98</b>	<b>0.57</b>

**Source: Research Data (2024)**

Table 4.6 shows the descriptive statistics for the responses on the items describing decision-making approach and biodiversity conservation in Laikipia County, Kenya. In the first item, 18(8.2%), 23(10.5%), 32(14.5%), 134(60.9%) and 13(15.9%) respondents disagreed, neither agreed nor disagreed, agreed and strongly agreed that land use decisions were made in participatory manner respectively. This item had a mean score of 3.46 implying that majority of the respondents agreed that land use decisions were made in participatory manner. The standard deviation of 1.03 implying that data had a high variation about the mean. The second item stated that decision-making processes were engaging whereby 2(0.9%), 13(5.9%), 127(57.7%) and 78(35.5%) respondents disagreed, neither agreed nor disagreed, agreed and strongly agreed with the item respectively. For the mean of 4.28, most of the respondents were in agreement that decision-making processes were engaging. The stability of opinions from respondents was deemed stable since standard deviation was moderate (0.61). In the third item, 7(3.2%) respondents disagreed, 11(5.0%), respondents neither agreed nor disagreed 169(76.8%) respondents agreed and 33(15.0%) respondents strongly agreed that decisions were adaptive. The mean of 4.04 implied that majority of the respondents were in strong agreement with the item and their opinions had low variations as indicated by the moderate standard deviation of 0.57.

In the fourth statement, 5(2.3%) respondents were neutral, 185(84.1%) were in agreement and 30(13.6%) were in strong agreement that conflicts were effectively resolved respectively. For the mean score of 4.11, most of the respondents were in strong agreement that conflicts were effectively resolve. The standard deviation of 0.38 implied a low variation of scores around the mean indicating data stability and reliability. The next item stated that all community interests were factored in shaping land use decisions that impact biodiversity whereby 3(1.4%), 14(6.4%), 184(83.6%) and 19(8.6%) respondents disagreed, neither agreed nor disagreed, agreed and strongly agreed with that statement respectively. The mean of 4.00 implied that most of the respondents were in agreement with the statement that all community interests were factored in shaping land use decisions that impact biodiversity and their opinions were stable since the standard deviation was low (0.45). In the sixth statement, 7(3.2%) respondents disagreed, 36(16.4%) respondents were neutral, 168(76.4%) respondents agreed and 9(4.1%) strongly greed that community knowledge about

biodiversity was factored in land use decision-making processes. However, most of the respondents were in agreement that community knowledge about biodiversity was factored in land use decision-making processes (mean = 3.81) and their opinions were deemed valid and indicated by moderate variation of scores around the mean (standard deviation = 0.55).

The seventh statement stated that community capacity and understanding of the links between land use choices and biodiversity conservation were factored in decision-making whereby: 4(1.8%), 17(7.7%), 177(80.5%) and 22(10.0%) respondents disagreed, neither agreed nor disagreed, agreed and strongly agreed with the statement respectively. But most of the respondents were in agreement that community capacity and understanding of the links between land use choices and biodiversity conservation were factored in decision-making (mean = 3.99). The data was stable for standard deviation = 0.5. In the last item, 12(5.5%) respondents were neutral, 171(78.2%) respondents agreed and 36(16.4%) respondents strongly agreed that there was continuous learning from community land use decisions for biodiversity conservation respectively. For the mean of 4.11, majority of the respondents strongly agreed that there was continuous learning from community land use decisions for biodiversity conservation. The rating was deemed stable for the moderate standard deviation of 0.54. The overall mean score for the items describing decision-making approach and biodiversity conservation in Laikipia County, Kenya was 3.98 implying that majority of the respondents were positive and on the affirmative on scoring of the 8 items describing the phenomenon. This finding was supported by the standard deviation of 0.58, indicating a relatively low variability in the opinions of the respondents.

#### **4.4.4 Community Land Registration Process and Biodiversity Conservation in Laikipia County**

This study sought to examine the effects of community land registration process on biodiversity conservation in Laikipia County, Kenya. This was important because the way land is registered and managed can significantly influence land use patterns, resource access, and conservation practices. Secure land tenure through registration can empower communities to take ownership of conservation efforts, while unclear or disputed land rights may lead to unsustainable practices. Community Land Registration Process was the third independent variable whose indicators included:

mobilization, documentation and validation. Respondents rated seven statements in the scale whereby: 1 represented Strongly Disagree, 2 represented Disagree, 3 represented None, 4 represented Agree and 5 represented Strongly Agree. Table 4.7 presents the descriptive data. The data in the brackets presents percentages.

**Table 4.7: Descriptive Data for Community Land Registration Process and Biodiversity Conservation in Laikipia County (n = 220)**

Items	1	2	3	4	5	Mean	SD
All community members were sensitized on community land registration process	4(1.8)	6(2.7)	47(21.4)	154(70.0)	9(4.1)	3.72	0.67
Community land registration influenced land ownership	0(0.0)	2(0.9)	9(4.1)	105(47.7)	104(47.3)	4.41	0.62
Community land registration influenced land access	1(0.5)	0(0.0)	12(5.5)	160(72.7)	47(21.4)	4.15	0.54
Documentations were important in community land registration	7(3.2)	7(3.2)	7(3.2)	159(72.3)	40(18.2)	4.01	0.79
Validation of land documentations was important in promoting sustainable land use practices	1(0.5)	3(1.4)	12(5.5)	154(70.0)	50(22.7)	4.13	0.60
Clarity of land rights affected community-driven conservation initiatives and practices	0(0.0)	3(1.4)	24(10.9)	152(69.1)	41(18.6)	4.05	0.59
Formal land registration affected biodiversity conservation	0(0.0)	3(1.4)	16(7.3)	130(59.1)	71(32.3)	3.22	0.63
<b>Combined</b>						<b>3.96</b>	<b>0.63</b>

**Source: Research Data (2024)**

The descriptives data shown in Table 4.7 shows the statistics for the responses on the items describing community land registration process and biodiversity conservation in Laikipia County, Kenya. In response to the first item, 4(1.8%) respondent strongly agreed, 6(2.7%) respondents disagreed, 47(21.4%) respondents were neutral, 154(70.0%) respondents agreed and 9(4.1%) respondents strongly agreed that all community members were sensitized on community land registration process respectively. For the mean of 3.72, majority of the respondents agreed that all community members were sensitized on community land registration process. With standard deviation of 0.67, the responses had low variation of scores about the mean implying data stability. The next item was answered as follows: 2(0.9%), 9(4.1%), 105(47.7%) and 104(47.3%) respondents disagreed, neither agreed nor disagreed,

agreed and strongly agreed that community land registration influenced land ownership respectively. The mean score of 4.41 implied that most of the respondents were in strong agreement that community land registration influenced land ownership. The opinions of the respondents had little variations around the mean (0.62). The third item stated that community land registration influenced land access whereby: 1(0.5%), 12(5.5%), 160(72.7) and 47(21.4%) respondents strongly disagreed, were neutral, in agreement and in strong agreement that community land registration influenced land access respectively. The mean of 4.15 implied that majority of the respondents agreed with the item. The stability of opinions from respondents was deemed stable since standard deviation was low (0.54).

In the fourth item, 7(3.2%) respondents strongly disagreed, 7(3.2%) respondents disagreed, 7(3.2%) respondents were neutral, 159(72.3%) respondents agreed while 40(18.2%) respondents strongly agreed that documentations were very important in community land registration. The of 4.01 indicated that majority of the respondents strongly agreed that item and their opinions had moderate variations as indicated by the standard deviation of 0.79. The responses on the statement that validation of land documentations was important in promoting sustainable land use practices was as follows: 1(0.5%), 3(1.4%), 12(5.5%), 154(70.0%) 50(22.7%) respondents were in strong disagreement, disagreement, neither in agreement nor disagreement, agreement and strong agreement respectively. The mean of 4.13 implied that most of the respondents were in strong agreement with the statement that validation of land documentations was important in promoting sustainable land use practices. There was moderate variation of scores about the mean since standard deviation of 0.60. In the sixth statement, 3(1.4%) respondent disagreed, 24(10.9%) respondents were neutral, 152(69.1%) respondents agreed and 41(18.6%) respondents strongly agreed that clarity of land rights affected community-driven conservation initiatives and practices. However, most of the respondents were in strong agreement with the statement that clarity of land rights affected community-driven conservation initiatives and practices (mean = 4.05) and their opinions were deemed valid as indicated by moderate variation of scores around the mean (standard deviation = 0.59). The statement that formal land registration affected biodiversity conservation whereby: 3(1.4%), 6(7.3%), 130(59.1%) and 71(32.3%) respondents disagreed, neither agreed nor disagreed, agreed and strongly agreed with the statement respectively. Most of the

respondents agreed that formal land registration affected biodiversity conservation. The standard deviation value of 0.63 indicated moderate stability of this rating. The general rating for community land registration process and biodiversity conservation in Laikipia County, Kenya showed that for the overall mean of 3.96, majority of the respondents agreed that community land registration process contributed to the biodiversity conservation in Laikipia County, Kenya. This finding was reliable since the variation about the mean was stable as indicated by the moderate standard deviation of 0.63.

#### **4.4.5 Enforcement Structures and Biodiversity Conservation in Laikipia County**

The study sought to determine the effects of enforcement structures on biodiversity conservation in Laikipia County, Kenya. This was important because enforcement structures, such as laws, regulations, and monitoring systems, play a crucial role in ensuring compliance with conservation policies. Effective enforcement can prevent illegal activities like poaching, deforestation, and land encroachment, which threaten biodiversity. Enforcement Structures was another independent variable whose indicators were: monitoring, incentives and accountability. Respondents rated seven statements in the scale whereby: 1 represented Strongly Disagree, 2 represented Disagree, 3 represented None, 4 represented Agree and 5 represented Strongly Agree. Table 4.8 presents the descriptive data. In brackets are percentages.

**Table 4.8: Descriptive Data for Enforcement Structures and Biodiversity Conservation in Laikipia County (n = 220)**

Items	1	2	3	4	5	Mean	SD
Monitoring of enforcement structures enhanced land use and biodiversity conservation	0(0.0)	8(3.6)	12(5.5)	169(76.8)	31(14.1)	4.01	0.59
People were given incentives in promoting biodiversity conservation	0(0.0)	0(0.0)	5(2.3)	188(85.5)	27(12.3)	4.10	0.37
Every community member was accountable for the land use in promoting biodiversity	0(0.0)	3(1.4)	16(7.3)	183(83.2)	18(8.2)	3.98	0.46
The legal framework for community land management for biodiversity conservation was enforceable	0(0.0)	9(4.1)	40(18.2)	163(74.1)	8(3.6)	3.77	0.58
Mechanisms existed to ensure compliance with conservation-oriented land management practices within registered community land	0(0.0)	4(1.8)	20(9.1)	172(78.2)	24(10.9)	3.98	0.52
Enforcement structures like penalties were effective in conservation of biodiversity	0(0.0)	1(0.5)	28(12.7)	166(75.5)	25(11.4)	3.97	0.55
There were no barriers to effective enforcement of conservation regulations within community land management	0(0.0)	0(0.0)	18(8.2)	172(78.2)	30(13.6)	4.05	0.46
<b>Combined</b>						<b>3.98</b>	<b>0.50</b>

**Source: Research Data (2024)**

Table 4.8 shows the descriptive statistics for the responses on the items describing enforcement structures and biodiversity conservation in Laikipia County, Kenya. In the first item, 8(3.6%), 12(5.5%), 169(76.8%) and 31(14.1%) respondents disagreed, neither agreed nor disagreed, agreed and strongly agreed with the statement respectively. This item had a mean score of 4.01 implying that majority of the respondents agreed that monitoring of enforcement structures enhanced land use and biodiversity conservation. The standard deviation of 0.59 implying that data had a moderate variation about the mean. The second item stated that people were given incentives in promoting biodiversity conservation whereby 5(2.3%), 188(85.5%) and 27(12.3%) respondents neither agreed nor disagreed, agreed and strongly agreed with

the item respectively. For the mean of 4.10, most of the respondents were in strong agreement that people were given incentives in promoting biodiversity conservation. The opinions of respondents were deemed stable since standard deviation was low (0.37). In the third item, 3(1.4%) respondents disagreed, 16(7.3%), respondents neither agreed nor disagreed 183(85.5%) respondents agreed and 18(8.2%) respondents strongly agreed that every community member was accountable for the land use in promoting biodiversity. The mean of 3.98 implied that majority of the respondents were in agreement with the item and their opinions had low variations as indicated by the moderate standard deviation of 0.45. In the fourth statement, 9 (4.1%) respondents were in disagreement, 40(18.2%) respondents were neutral, 163(74.1%) were in agreement and 8(3.6%) were in strong agreement that legal framework for community land management for biodiversity conservation was enforceable. For the mean score of 3.77, most of the respondents were in agreement that legal framework for community land management for biodiversity conservation was enforceable. The standard deviation of 0.58 implied a moderate variation of scores around the mean indicating data stability and reliability.

The next item stated that mechanisms existed to ensure compliance with conservation-oriented land management practices within registered community land whereby 4(1.8%), 20(9.1%), 172(78.2%) and 24(10.9%) respondents disagreed, neither agreed nor disagreed, agreed and strongly agreed with that statement respectively. The mean of 3.98 implied that most of the respondents were in agreement that mechanisms existed to ensure compliance with conservation-oriented land management practices within registered community land and their opinions were stable since the standard deviation was low (0.45). In the sixth statement, 1(0.5%) respondent disagreed, 28(12.7%) respondents were neutral, 166(75.5%) respondents agreed and 25(11.4%) strongly agreed that enforcement structures like penalties were effective in conservation of biodiversity respectively. However, most of the respondents were in agreement that enforcement structures like penalties were effective in conservation of biodiversity (mean = 3.97) and their opinions were deemed valid and indicated by moderate variation of scores around the mean (standard deviation = 0.55). The seventh statement stated that there were no barriers to effective enforcement of conservation regulations within community land management whereby: 18(8.2%), 172(78.2%) and 30(13.6%) respondents neither

agreed nor disagreed, agreed and strongly agreed with the statement respectively. But most of the respondents were in strong agreement that there were no barriers to effective enforcement of conservation regulations within community land management (mean = 4.05). The standard deviation value of 0.50 indicated steadiness of this rating.

The overall rating of enforcement structures and biodiversity conservation in Laikipia County, Kenya was 3.98 implying that majority of the respondents were in agreement with the 7 items describing the phenomenon. This finding was supported by the moderate standard deviation of 0.50, indicating a relatively low variability in the opinions of the respondents.

#### **4.5 Qualitative Results**

Qualitative data that were collected through interviews and direct field observations to gain deeper insights into community land management practices and their influence on biodiversity conservation in Laikipia County are presented in the next section.

##### **4.5.1 Biodiversity Conservation in Laikipia County, Kenya**

Under this theme, qualitative data was collected using interviews and direct observation. The findings from the interview with the government officers and managers of the conservancy firms that the Laikipia County was experiencing transformation in the land use practices whereby community involvement in conservation efforts was bearing positive benefits as far as the increase in the forest cover, proliferation and diversity of species was concerned. For instance, when asked to evaluate the state of biodiversity conservation in biodiversity in Laikipia County, the summarized response was,

“There are significant improvements in biodiversity conservation here..... The community-driven conservation initiatives.....have led to a noticeable increase in forest cover, a greater diversity of species and overall positive changes in land use practices across the County.... collaborative efforts have not only enhanced forest cover but also improved the overall ecological balance within the region.... involvement of the local communities had been crucial in reversing deforestation trends.....examples are how areas previously suffering from degradation were now seeing a resurgence of native plant and animal species, thanks to coordinated conservation activities” (KI1).

From this finding the following themes were generated: community-driven conservation initiatives in Laikipia County have significantly improved biodiversity conservation. These collaborative efforts have resulted in increased forest cover, greater species diversity, and positive changes in land use practices. The second theme is that active involvement of local communities has been crucial in reversing deforestation trends, leading to the resurgence of native plant and animal species in previously degraded areas, ultimately restoring ecological balance in the region. These findings as illustrated by the government officers and managers of conservations firms that community involvement has enhanced biodiversity conservation in Laikipia County aligned positively with the following observations:

“There were notable practices like the agroforestry that have been promoted, while negative trends like habitat loss, disruption of ecological processes and land fragmentation were slowly declining. Nevertheless, challenges of land fragmentation like in Rimuruti and Nyahururu forests were observed to continue posing threat, indicating the need for continuous coordination of biodiversity conservation effort.s” (OB1).

“Another observation was made with regard to reduction in logging as evidenced by increase forest cover. These efforts may have collectively contributed to improved forest heaths e.g. Nyahururu, Susu and Mbololo forests. However, the momentum for reforestation and preventing deforestation remains a challenge that requires continuous community engagement and government support” (OB2).

“The composition of species in Laikipia County was observed as diversified, indicating a positive response to the conservation measures implemented by the community. Nonetheless, certain species of trees like in Ngangao, Iyale and Fururu forests still face threats from environmental changes and human activities, suggesting that targeted conservation strategies may be necessary to protect vulnerable species” (OB3).

“There was noticeable increase in the variety of tress species, demonstrating the wide-ranging impact of the conservation efforts on the region’s biodiversity. But the ongoing monitoring and adaptive management are essential to ensure that this biodiversity is maintained in the face of potential future threats across all forests” (OB4)

The findings from the observation guide generated the following themes: that positive promotion of agroforestry and other sustainable practices has led to significant improvements in biodiversity and a decline in negative trends like habitat loss and ecological disruption. The second themes were that despite progress, challenges such

as land fragmentation, particularly in areas like Rimuruti and Nyahururu forests, continue to threaten biodiversity, highlighting the need for coordinated conservation efforts. The other theme is a decrease in logging activities has contributed to increased forest cover and healthier ecosystems in regions like Nyahururu, Susu, and Mbololo, but sustaining this momentum for reforestation requires ongoing community involvement and government support. Finally, the observation of a diversified species composition indicates positive responses to conservation measures; however, certain tree species in Ngangao, Iyale, and Fururu forests remain vulnerable, necessitating targeted conservation strategies.

The consistency of these findings illustrates the undergoing a transformation in land use practices that in Laikipia County driven by community land management efforts. Community involvement in conservation efforts was yielding positive outcomes, particularly in terms of increased forest cover, species proliferation and biodiversity. The findings align with the existing literature that effective biodiversity conservation is usually fostered through local stewardship and sustainable land use practices (Neil et al., 2021). Literature further supports those changes in land use for instance adoption of agroforestry, can significantly reduce habitat loss, mitigate ecological disruptions and prevent land fragmentation. The findings consistently align with existing knowledge that efforts like afforestation and reforestation are vital elements that foster forest health and combating deforestation (Ukpoju, et al., 2023). This is because increased species richness and diversity are often observed in regions where local communities actively participate in conservation initiatives. Despite positive outcomes, ongoing challenges e.g. land fragmentation and environmental changes pose threat to vulnerable species and need be addressed per the prevailing needs.

#### **4.5.2 Governance Structures and Biodiversity Conservation in Laikipia County, Kenya**

Under this theme, qualitative data was collected using interviews with managers of the conservancy firms and government officers that highlighted the importance of effective governance in promoting successful conservation outcomes. For example, when asked to explain how community governance structures related to the conservation of biodiversity in Laikipia County, the response was:

“Governance structures in our community play a crucial role in biodiversity conservation by ensuring that local stakeholders are actively involved in decision-making processes. These structures facilitate collaboration between government agencies, conservancy organizations, and local communities, leading to more effective and targeted conservation efforts. Through regular meetings, transparent communication and participatory planning, we can address environmental challenges, enforce conservation policies and promote sustainable practices that enhance biodiversity.....the active involvement of community members in monitoring and managing natural resources also helps in preserving local ecosystems and species.” (KI2).

From the interview, two themes were generated: effective governance structures foster active involvement of local stakeholders in decision-making processes, promoting collaboration among government agencies, conservancy organizations, and community members and regular meetings, transparent communication, and participatory planning facilitate the enforcement of conservation policies and the promotion of sustainable practices.

#### **4.5.3 Decision-making Approaches and Biodiversity Conservation in Laikipia County**

Responses from interviews showed a positive impact of decision-making processes on biodiversity conservation in Laikipia County. For instance, when asked to express their thoughts about decision-making approaches towards conservation of biodiversity in Laikipia county, the government officers and managers of the conservancy firms said that,

“Participation, adaptiveness and conflict resolution are crucial for the success of any development discourse. Involving the community in decision-making towards conservation efforts ensures that their local voices are heard and their knowledge is utilized. Being adaptive allows us to adjust our strategies as needed, especially with changing environmental conditions. Effective conflict resolution is essential to maintain cooperation among all stakeholders, which is vital for the success of our conservation efforts.” (KI3).

This finding led to generation of the following themes: that active participation of the community in decision-making processes for conservation efforts ensures that local voices are heard and their knowledge is integrated, fostering a sense of ownership and commitment to biodiversity preservation. The other is that the ability to adapt strategies in response to changing environmental conditions, coupled with effective

conflict resolution among stakeholders, is essential for maintaining cooperation and ensuring the success of conservation initiatives. The findings shows that decision-making approaches in Laikipia County, particularly those emphasizing participation, adaptability and conflict resolution were pivotal in fostering effective biodiversity conservation. The active involvement of communities, the ability to adjust strategies in response to changing conditions, and the resolution of conflicts among stakeholders collectively contributed to the success of conservation efforts in the region

#### **4.5.4 Community Land Registration Process and Biodiversity Conservation in Laikipia County**

The results from descriptive results were in agreement with the qualitative findings from the interviews with managers of the conservancy firms and government officers that emphasised the importance of securing land tenure for local communities for ownership and commitment in biodiversity conservation efforts. When asked to explain how relevant was the community land registration process to conservation of biodiversity in Laikipia county, the summarized response was,

“Community land registration process ensured security of tenure which was crucial in fostering a sense of ownership and responsibility among community members. ...This in turn encouraged sustainable land use practices and contributed to the conservation of biodiversity. The community land registration process was thus perceived as a key factor in reducing land conflicts, preventing illegal encroachments, and promoting collaborative conservation efforts between local communities and conservation organizations in Laikipia County, Kenya. However, conflicting stakeholder interests and balancing land ownership needs remains a big challenge in land registration processes” (KI4).

From this finding, the first theme generated is that the community land registration process enhances security of tenure, fostering a sense of ownership and responsibility among community members, which encourages sustainable land use practices and contributes to biodiversity conservation. The second theme is that while the land registration process helps reduce conflicts and promotes collaboration between communities and conservation organizations, conflicting stakeholder interests and the need to balance land ownership continue to pose significant challenges.

#### **4.5.5 Enforcement Structures and Biodiversity Conservation in Laikipia County**

The qualitative insights gathered from interviews with conservation managers and government representatives emphasized on effective enforcement structures in safeguarding biodiversity in Laikipia County. They attributed the prevailing success in biodiversity conservation in Laikipia County to well-established and functioning enforcement mechanisms, which involved community-based ranger programs, regular monitoring and strict penalties for illegal activities. For example, when asked to explain the existing community enforcement structures on community land use with impacts on conservation of biodiversity in Laikipia county, the response was,

For instance, when asked to express their thoughts about Enforcement Structures towards conservation of biodiversity in Laikipia county, the government officers and managers of the conservancy firms said that,

“...the presence of functional community integrated mechanism for enforcing sustainable land use and protection of biodiversity ... community-based ranger programs where trained local rangers patrol and monitor the land, ensuring that conservation regulations are adhered to.... not only deters illegal activities like poaching and unauthorized land use but also fosters a culture of compliance and stewardship among community members, sanctions.... when enforcement is perceived as fair and consistent, it strengthens community trust in the conservation efforts, leading to greater cooperation and participation in biodiversity conservation initiatives.... however, laws are still broken indicating that more collaborative efforts are needed” (KI5

The findings reveal the importance of robust enforcement structures in monitoring, giving incentives and promoting accountability ensured continued success of biodiversity conservation initiatives in Laikipia County. The integration of local communities into these efforts was found to enhance the effectiveness and sustainability of biodiversity conservation efforts.

#### **4.6 Inferential Statistics**

The following sections present the results of correlation and regression analyses, which served as the key inferential statistics for the study

#### 4.6.1 Correlational Matrix

The correlational results for community land management system (governance structure, decision-making approaches, community land registration process and enforcement structures) and biodiversity conservation in Laikipia County is shown in Table 4.9

**Table 4.9: Relationship between Project Contract Management Practices and Biodiversity conservation in Laikipia County, Kenya and Biodiversity conservation in Laikipia County, Kenya**

	Biodiversity conservation in Laikipia County, Kenya	Governance structure	Decision-making approaches	Community land registration process	Enforcement structures
Biodiversity conservation in Laikipia County, Kenya	1				
Governance structure	0.67*	1			
Decision-making approaches	0.74**	0.35**	1		
Community land registration process	0.35**	0.20**	0.26**	1	
Enforcement structures	0.75**	0.43*	0.60**	0.24**	0.46**
	0.00	0.00	0.01	0.10	0.02
	220	220	220	220	220

\*\* . Correlation was said to be significant 0.05 for 2-tailed

**Source: Research Data (2024)**

Table 4.9 shows the coefficient of correlational results for community land management system and biodiversity conservation in Laikipia County whereby the strength of relationships is as follows: enforcement structures (r=0.75), decision-making approaches (r=0.74), governance structure (r=0.67) and community land registration process (r=0.35). Enforcement structures had the highest correlation coefficient implying that enforcement structures had the strongest positive impact on

biodiversity conservation in Laikipia County. It indicates that the presence of strong enforcement mechanisms plays a central role in enforcing conservation policy and legislation compliance, and thereby directly impacts the success of biodiversity conservation endeavors. Strong enforcement would most likely enhance accountability, deter environmentally degrading activities, and promote compliance with sustainable land use. On the other hand, the relatively weaker linkage to land registration implies that while legal formalization of landholdings is important, its impact on conservation results is indirect or mediated by intervening factors such as enforcement capacity and the quality of governance.

The findings underscore the benefit of integrating local communities in enforcement efforts which led to effective and successful biodiversity conservation efforts. By involving community members in enforcement activities, the conservation efforts were reportedly gaining greater local support and ownership. These findings align with the findings from research by Atuo et al. (2020) on law enforcement and community regulation and biodiversity conservation in Nigeria whereby community sanctions were found to play an important role that influenced behaviors and compliance in conservation efforts. In similar vein, Gulte et al (2023) did a study to examine local communities' commitment on protected areas in Bale Mountains in Ethiopia. These findings align with the research study by Danielle et al. (2022) and Armitage et al. (2020) who found that effective governance structures are instrumental in promoting community engagement and enhancing biodiversity conservation efforts. The finding that decision-making approaches affects biodiversity aligns with those of Virk et al. (2023) and Newig et al. (2023) that emphasize the significance of inclusive decision-making, adaptability and conflict resolution in achieving effective biodiversity conservation. The findings that community land registration process had significant relationship with biodiversity conservation aligns with the findings from a study by Katusiime and Schutt (2020) that land registration influences biodiversity conservation as it affects acquisition, ownership, security, access and use. It also collaborates with Lofroth et al. (2023) who found that land registration affects ownership, land sharing, land sparing and conservation outcomes.

This finding aligns with the broader stakeholder's theory which posits that the success of any project, including biodiversity conservation, relies on the involvement and

cooperation of all relevant stakeholders. In Laikipia County, the active engagement of community members, government officials and conservation firms reflect the principles of stakeholder theory, where the participation and interests of all parties contribute to positive conservation outcomes (Van & Harry, 2016). The finding from this study rhymes also with theory of management of common pool resources which suggests that communities can effectively manage shared resources, like biodiversity, through collective action and governance structures (Ali & Kamraju, 2023). The findings align with this theory by demonstrating that community-driven governance in Laikipia County has led to successful biodiversity conservation, indicating that when local communities are empowered to manage their resources, they can achieve sustainable outcomes. Finally, the findings fall within the broader theoretical concept of sustainable development whereby sustainability theory emphasizes the need for long-term resource management that balances environmental, social and economic factors (Zhu, 2019). The findings support this theory by showing that the governance structures in Laikipia County not only contribute to the immediate conservation of biodiversity but also promote sustainable practices that ensure the longevity and resilience of ecosystems for future generations.

#### 4.6.2 Regression Results

Community land management system was the main independent variable and its constructs were: governance structure, decision-making approaches, community land registration process and enforcement structures. Biodiversity conservation in Laikipia County, Kenya was regressed against community land management system.

**Table 4.10: Regression Model Summary**

Model Summary									
Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate	Change in R <sup>2</sup>	Change in F	Change in df1	Change in df2	Sig.
1	0.90 <sup>a</sup>	0.81	0.81	0.12	0.81	233	4	215	0.00

**Source: Research Data (2024)**

According to the statistics in the model summary in Table 4.10, the model predicted 81% variation in the biodiversity conservation in Laikipia County, Kenya (for  $R^2=0.81$ ). This means that enforcement structures, decision-making approaches, governance structures and the community land registration process collectively explain a significant portion of the changes observed in biodiversity conservation outcomes. The remaining 19% of the variation was due to other factors not considered in the model. These could include environmental variables like rainfall patterns, socio-economic factors like poverty levels, institutional capacities or cultural attitudes toward conservation. This indicates that while the model was strong and reliable, biodiversity conservation is a multifaceted issue that may require broader, interdisciplinary analysis to fully understand all influencing elements.

**Table 4.11: ANOVA Summary**

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.78	4	3.19	233	0.00
	Residual	2.95	215	0.01		
	Total	15.73	219			

a Dependent Variable: Biodiversity conservation in Laikipia County, Kenya

b Predictors: (Constant), governance structure, decision-making approaches, community land registration process and enforcement structures

**Source: Research Data (2024)**

Table 4.11 shows for  $p=0.00<0.05$ ,  $F=233$ , the model was significant in estimating biodiversity conservation in Laikipia County, Kenya. This implies that there was a very low probability that the observed relationship between community land management components and biodiversity conservation occurred by chance. The high F-value ( $F = 233$ ) further suggests that the model has a strong explanatory power and that at least one of the independent variables significantly contributes to explaining the variation in biodiversity conservation outcomes.

**Table 4.12: Beta Coefficients and Significance**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-0.17	0.152		-1.10	0.27
	Governance structure	0.33	0.029	0.38	11.39	0.00

Decision-making approach	0.34	0.033	0.38	10.39	0.00
Community land registration process	0.09	0.028	0.10	3.15	0.00
Enforcement structure	0.27	0.033	0.32	8.39	0.00

a. Dependent Variable: Biodiversity conservation in Laikipia County, Kenya

**Source: Research Data (2024)**

From the coefficient summary in Table 4.12, biodiversity conservation in Laikipia County is constant at -0.17. Holding other factors constant, one-unit increase in each of the independent variables namely: governance structure, decision-making approaches, community land registration process and enforcement structures would result into 0.38, 0.38, 0.10 and 0.32 variation in the biodiversity conservation in Laikipia County respectively.

Thus, the simplified model becomes,  $Y = -0.17 + 0.38X_1 + 0.38X_2 + 0.10X_3 + 0.32X_4 + \epsilon$ . Where:

Y is Biodiversity conservation in Laikipia County, Kenya in Embu County,

X<sub>1</sub> is governance structure

X<sub>2</sub> is decision-making approaches

X<sub>3</sub> is community land registration process

X<sub>4</sub> is enforcement structures,

β<sub>0</sub> is constant and β<sub>1</sub>, β<sub>2</sub>, β<sub>3</sub>, β<sub>4</sub> are determination coefficients for X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>, X<sub>4</sub>, respectively and ε is term of error.

The model suggests that governance structure and decision-making approaches are the most critical factors in promoting biodiversity conservation in Laikipia County, followed by enforcement structures, while the community land registration process has a smaller, yet still positive, impacts. The findings partly collaborate with those of studies conducted by other researchers, indicating that while there are similarities, there are also differences in the impact of certain variables on biodiversity conservation. For example, the significance of governance structure and decision-making approaches in the model aligns with studies like Lofroth et al. (2023), which also highlighted the critical role of governance in environmental management and

conservation outcomes. Similarly, Atuo et al. (2020) found that effective decision-making processes were crucial in ensuring compliance and positive conservation outcomes, particularly when local communities were involved. However, the findings related to the community land registration process differ from some studies. While this model suggests that the community land registration process has a relatively modest impact on biodiversity conservation (coefficient of 0.10), other research, such as the work by Katusiime and Schutt (2020), has shown a stronger relationship between land registration and biodiversity conservation, particularly in contexts where land ownership and security significantly influence resource use patterns. Similarly, while enforcement structures are shown to have a significant impact in this model, Chen et al. (2019) found no significant link between community law enforcement and increased biodiversity in a study conducted in China. This discrepancy suggests that the effectiveness of enforcement structures may vary depending on regional and other contextual factors

## **CHAPTER FIVE: SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS**

### **5.1 Introduction**

This study examined the influence of community land management systems on biodiversity conservation in Laikipia County, Kenya. This chapter presents the summary of the key findings, conclusions drawn from the research and recommendations based on the analysis.

### **5.2 Summary of the Findings**

The underneath sections presents the summary of the findings per variable

#### **5.2.1 Governance Structures and Biodiversity Conservation**

The first objective sought to assess the effects of governance structures on biodiversity conservation in Laikipia County, Kenya. In the rating of governance structure and biodiversity conservation in Laikipia County, Kenya, descriptive statistics indicated that majority of the respondents strongly agreed that governance structure contributed to the biodiversity conservation in Laikipia County, Kenya. From the inferential statistics, community governance structures had a moderate positive relationship with conservation of biodiversity in Laikipia County.

#### **5.2.2 Decision-making Approaches and Biodiversity Conservation**

The second objective sought to establish the effects of decision-making approaches on biodiversity conservation in Laikipia County, Kenya whereby most of the respondents strongly agreed that decision-making approach contributed to biodiversity conservation in Laikipia County, Kenya. The correlational results indicated that a strong positive relationship between community decision-making approaches and conservation of biodiversity in Laikipia County.

#### **5.2.3 Community Land Registration Process and Biodiversity Conservation**

The third objective aimed to examine the effects of community land registration process on biodiversity conservation in Laikipia County, Kenya. The general rating showed that majority of the respondents agreed that community land registration process contributed to the biodiversity conservation in Laikipia County, Kenya. The

inferential statistics showed that community land registration process had a weak positive relationship with conservation of biodiversity in Laikipia County.

#### **5.2.4 Enforcement Structures and Biodiversity Conservation**

Objective four sought to determine the effects of enforcement structures on biodiversity conservation in Laikipia County, Kenya whereby, majority of the respondents were in agreement that enforcement structures contributed to biodiversity conservation in Laikipia County, Kenya. The correlational results revealed a strong positive relationship between community enforcement structures and conservation of biodiversity in Laikipia County.

#### **5.2.5 Community Land Management System and Biodiversity Conservation**

The main goal of the study was to examine the influence of community land management system (governance structure, decision-making approaches, community land registration process and enforcement structures) on biodiversity conservation in Laikipia County, Kenya. Regression analysis showed that the model predicted a substantial proportion of the variation in biodiversity conservation in Laikipia County, Kenya. The model was also deemed statistically significant in estimating biodiversity conservation in the region, indicating that the selected variables provided a reliable explanation of conservation outcomes.

### **5.3 Conclusion**

Governance structures and decision-making approaches were found to significantly enhance biodiversity conservation in Laikipia County. Strong community governance and inclusive decision-making emerged as key predictors, highlighting their critical role in promoting effective conservation efforts. The study concluded that both community land registration processes and enforcement structures contribute to biodiversity conservation in Laikipia County, Kenya. However, while land registration processes have a limited positive impact, enforcement structures have a strong and significant influence and are crucial predictors of successful biodiversity conservation outcomes.

The overall goal finding was that community land management system was a good predictor of biodiversity conservation in Laikipia County, Kenya. Hence the

conclusion that enhancing community land management through improved governance, inclusive decision-making, effective land registration and strong enforcement mechanisms can significantly contribute to better biodiversity conservation outcomes. Strengthening these aspects of land management is essential for sustaining and improving local biodiversity and ecological health.

#### **5.4 Recommendations**

The government should develop and enforce policies that promote inclusive and participatory governance structures, including community involvement in decision-making processes. This can be supported through capacity-building initiatives such as workshops, training, and forums to enhance local engagement in biodiversity conservation.

**Enhance Land Registration and Enforcement Mechanisms:** To improve biodiversity conservation, the government should simplify and expedite the community land registration process, making it more accessible and transparent. Additionally, it should strengthen enforcement structures by supporting community-led initiatives with adequate resources, training, and legal authority to address land management and conservation challenges effectively.

#### **5.5 Suggestions for Further Research**

Researchers on community land management should conduct further research to explore the relationship between community land management systems and biodiversity conservation in different contexts for more generalizable findings. The academia should also examine the interaction between environment conservation policies and land management practices to realize sustainable biodiversity conservation.

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## **APPENDICES**

### **Appendix I: Introductory Letter**

**FRANCIS. L.CHARLES.**

**Dear Respondent,**

#### **REQUEST AS A PARTICIPANT IN RESEARCH PROCESS**

I am Francis Charles, a student pursuing a degree at Kenyatta University. I am carrying out a study with the title “community land management systems and biodiversity conservation of selected community conservancies in Laikipia county, Kenya.

You have been identified as potential respondents in answering the questions in the attached instrument. The research outcomes will be of benefit to all of us and most importantly to the sustenance of live.

**Sincerely,**

**FRANCIS. L.CHARLES.**

## Appendix II: Questionnaire for Representatives of Community Land

Kindly, answer to the following questions by ticking against the answer that suits you.

### Sociodemographic Information

#### 1. Indicate your Gender?

Male [ ]

Female [ ]

#### 2. Indicate your Age Group

18-35 years [ ]    36-45 years [ ]    46-55 years [ ]    56-65 years [ ]    66 years and above [ ]

### Biodiversity Conservation in Laikipia County

In the boxes given, rate the level to which you agree with the listed items on biodiversity conservation in Laikipia County whereby; 1 = Strongly Disagree, 2= Disagree, 3= None, 4= Agree and 5=Strongly Agree

	<b>Statements on biodiversity conservation in Laikipia County</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
3.	This County has experienced immense changes in land use					
4.	There is rapid reduction in deforestation					
5.	Sustainable land use practices like agroforestry have helped mitigate the negative effects on ecosystem					
6.	Afforestation has promoted biodiversity conservation					
7.	Community forest preservation has led to abundance of species					
8.	I have observed changes in the population sizes of wildlife species in my local area over the past few years.					
9.	Selective logging has enhanced conserving biodiversity					
10.	Balancing human needs with forest cover practices has increased diversity of species					
11.	There is abundance of crops and animals in my locality					
12.	I fully support measures to conserve threatened or endangered species					
What other information do you have with regard to biodiversity conservation in Laikipia County-----						
-----						
-----						

### Community Land Management Systems

In the boxes given, rate the level to which you agree with the listed items on community land management systems in Laikipia County whereby; 1 = Strongly Disagree, 2= Disagree, 3= None, 4= Agree and 5=Strongly Agree

<b>Statements on Governance Structure</b>		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
13.	Our community leadership has ensured success of biodiversity conservation					
14.	It is the role of the community leadership to mobilize community member in biodiversity conservation efforts?					
15.	Community leaders engage members to participate actively in conservation projects					
16.	Community leaders ensure strong collaboration with external stakeholders in biodiversity conservation efforts					

17.	We have working groups which are well coordinated in promoting biodiversity conservation					
18.	We have strong networking framework on biodiversity conservation					
19.	Leadership styles are most effective in fostering collaborative biodiversity conservation					
What other information do you have with regard to governance structure in community land management systems in Laikipia County -----						
-----						
<b>Statements on Decision-making Approaches</b>		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
20.	Land use decisions are made in participatory manner					
21.	Decision-making processes are engaging					
22.	Decisions are adaptive					
23.	Conflicts are effectively resolved					
24.	All community interests are factored in shaping land use decisions that impact biodiversity					
25.	Community knowledge about biodiversity is factored in land use decision-making processes					
26.	Community capacity and understanding of the links between land use choices and biodiversity conservation is factored in decision-making					
27.	There is continuous learning from community land use decisions for biodiversity conservation					
Give any other information with regard to decision-making approaches in community land management systems in Laikipia County -----						
-----						
<b>Statements on Community Land Registration Process</b>		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
28.	All community members are sensitized on community land registration process					
29.	Community land registration influences land ownership					
30.	Community land registration influence land access					
31.	Documentation is very importance in community land registration					
32.	Validation of land documentations is important in promoting sustainable land use practices					
33.	Clarity of land rights affect community-driven conservation initiatives and practices					
34.	Formal land registration affects biodiversity conservation?					
What other information do you have with regard to community land registration process in community land management systems in Laikipia County -----						
-----						
<b>Statements on Enforcement Structures</b>		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
35.	Monitoring of enforcement structures enhances land use and biodiversity conservation					
36.	People are given incentives in promoting biodiversity					

	conservation					
37.	Every community member is accountable for the land use in promoting biodiversity					
38.	The legal framework for community land management for biodiversity conservation is enforceable					
39.	Mechanisms exist to ensure compliance with conservation-oriented land management practices within registered community land					
40.	Enforcement structures like penalties are effective in conservation of biodiversity					
41.	There are no barriers to effective enforcement of conservation regulations within community land management					
Provide other information with regard to enforcement structures in community land management systems in Laikipia County -----						
-----						
-----						

**Thank you.**

## **Appendix III: Interview Guide for Government Officer and Managers of Conservancy Firms**

### **Introduction**

The research objectives were shared with the interviewee. Following that, sociodemographic characteristics of the interviewee was taken.

### **Main Interview Questions**






1. How would you rate conservation of biodiversity in Laikipia county?
2. Explain the community land management systems in the County?
3. How are the governance structures of community relative to conservation of biodiversity in Laikipia county?
4. Do you think the decision-making approaches are of any help to conservation of biodiversity in Laikipia county?
5. How relevant is the community land registration process to conservation of biodiversity in Laikipia county?
6. Are there enforcement structures for community land use that have impacts on conservation of biodiversity in Laikipia county? explain.

#### Appendix IV: Observation Guide

The observation guide will reflect on the main points regarding the community land management systems and biodiversity conservation in Laikipia county, Kenya.

Observation areas	Comments
<b>Change in land use</b> e.g. agroforestry, loss of habitation, disruption of ecological processes, land fragmentation etc.	
<b>Forest cover:</b> deforestation, afforestation, reafforestation, forest health etc.	
<b>Abundance of species:</b> richness, abundance, and composition etc.	
<b>Diversity of species:</b> crop diversity, animal diversity	

## Appendix V: NACOSTI Research Permit

 <p>REPUBLIC OF KENYA</p>	 <p><b>NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY &amp; INNOVATION</b></p>
Ref No: <b>536601</b>	Date of Issue: <b>23/July/2024</b>
<b>RESEARCH LICENSE</b>	
	
<p><b>This is to Certify that Mr. Francis .L. Charles Lenantiri of Kenyatta University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Laikipia on the topic: COMMUNITY LAND MANAGEMENT SYSTEMS AND BIODIVERSITY CONSERVATION IN LAIKIPIA COUNTY, KENYA for the period ending : 23/July/2025.</b></p>	
License No: <b>NACOSTI/P/24/38234</b>	
Applicant Identification Number: <b>536601</b>	
	Director General
	<b>NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY &amp; INNOVATION</b>
	Verification QR Code
	
<p><b>NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.</b></p>	
<b>See overleaf for conditions</b>	

## Appendix VI: Research Approval



### KENYATTA UNIVERSITY GRADUATE SCHOOL

E-mail: [dean-graduate@ku.ac.ke](mailto:dean-graduate@ku.ac.ke)

P.O. Box 43844, 00100  
NAIROBI, KENYA  
Tel. 810901 Ext. 4150

Website: [www.ku.ac.ke](http://www.ku.ac.ke)

#### Internal Memo

**FROM:** Executive Dean, Graduate School

**DATE:** 8<sup>th</sup> July, 2024

**TO:** Francis Lopeyok Charles Lenantiri  
C/o Public Policy and Administration Dept.

**REF:** C153/CTY/OL/22521/2021

#### SUBJECT: APPROVAL OF RESEARCH PROJECT PROPOSAL


This is to inform you that Graduate School Board at its meeting of 19<sup>th</sup> June, 2024 approved your Research Project Proposal for the M.PPA Degree Entitled, "Community Land Management Systems and Biodiversity Conservation in Laikipia County, Kenya."

You may now proceed with your Data Collection, Subject to Clearance with Director General, National Commission for Science, Technology and Innovation.

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking and Progress Report Forms per semester. The Forms are available at the University's Website under Graduate School webpage downloads.

Also, please ensure that you publish article(s) from your project before submitting it to Graduate School for examination as per the Commission for University Education and Kenyatta University guidelines.

Thank you.

  
ELIJAH MUTUA

**FOR: EXECUTIVE DEAN, GRADUATE SCHOOL**

c.c. Chairman, Public Policy and Administration Department.

Supervisors:

1. Dr. Wilson Muna  
C/o Department of Public Policy and Administration  
**Kenyatta University**

EM/mo

*Transforming Higher Education... Enhancing Lives*

Kenyatta University is ISO 9001:2015 Certified



Page 1 of 1

## Appendix VII: Research Authorization



KENYATTA UNIVERSITY  
GRADUATE SCHOOL

E-mail: [dean-graduate@ku.ac.ke](mailto:dean-graduate@ku.ac.ke)

Website: [www.ku.ac.ke](http://www.ku.ac.ke)

P.O. Box 43844, 00100  
NAIROBI, KENYA  
Tel. 8710901 Ext. 57530

Our Ref: C153/CTY/OL/22521/2021

DATE: 8<sup>th</sup> July, 2024

Director General,  
National Commission for Science, Technology  
and Innovation  
P.O. Box 30623-00100  
**NAIROBI**

Dear Sir/Madam,

**RE: RESEARCH AUTHORIZATION FOR FRANCIS LOPEYOK CHARLES  
LENANTIRI – REG. NO. C153/CTY/OL/22521/2021**

I write to introduce Francis Lopeyok Charles Lenantiri who is a Postgraduate Student of this University. The student is registered for M.PPA degree programme in the Department of Public Policy and Administration.

Francis intends to conduct research for a M.PPA Project Proposal entitled, “Community Land Management Systems and Biodiversity Conservation in Laikipia County, Kenya.”

Any assistance given will be highly appreciated.

Yours faithfully,

**PROF. ELIUD NJAGI**  
**EXECUTIVE DEAN, GRADUATE SCHOOL**

EM/mo



Appendix VIII: Sample Determination Table (Krejcie & Morgan, 1970)

<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

## Appendix IX: Approval From Director of Education, Laikipia County

MINISTRY OF EDUCATION  
STATE DEPARTMENT OF EDUCATION  
COUNTY DIRECTOR OF EDUCATION OFFICE - LAIKIPIA

Telegrams: "Education" LKP.  
Telephone: 062-31518, 31519  
Email: laikipiacountydirector@yahoo.com



County Director of Education,  
Laikipia County,  
P.O. Box 253.  
NANYUKI.

When replying please quote:  
Ref: LPA/C/A/94 VOL.II/ (22)

5<sup>th</sup> August, 2024

TO: WHOM IT MAY CONCERN

RE: RESEARCH AUTHORITY – CHARLES FRANCIS LOPEYOK ID NO.31755337

The National Commission for Science, Technology and Innovation letter, License No. NACOSTI/P/24/38234 dated 23<sup>rd</sup> July, 2024 refers.

This is to inform you that the above named person has been authorized to carry out research on "*Community Land Management systems and Biodiversity Conservation in Laikipia County, Kenya* for a period ending 23<sup>rd</sup> July, 2025.

After completion of your research findings please furnish this office with a copy of the research.

A handwritten signature in blue ink, appearing to read 'Amadi Mugasia'.

DR. AMADI MUGASIA.  
For: COUNTY DIRECTOR OF EDUCATION,  
LAIKIPIA.



C.C.  
National Commission for Science,  
Technology and Innovation,  
NAIROBI.

The County Commissioner,  
LAIKIPIA.

**Appendix X: Approval from County Commissioner Laikipia County**



**OFFICE OF THE PRESIDENT  
MINISTRY OF INTERIOR & NATIONAL ADMINISTRATION  
State Department for Internal Security & National Administration**

When replying please quote  
Fax: 062-2031874  
E-MAIL: [ccia-laikipiacounty@yahoo.com](mailto:ccia-laikipiacounty@yahoo.com)

COUNTY COMMISSIONER  
LAIKIPIA COUNTY  
P.O. BOX 11-10400  
NANYUKI

Ref. No. CC.ED.12/14 VOL.II/ (197)

5<sup>th</sup> August, 2024

Deputy County Commissioners,  
**LAIKIPIA**

**RE: RESEARCH AUTHORIZATION – FRANCIS LOPEYOK CHARLES  
LENANTIRI REG.NO.C153/CTY/OL/22521/2021**

The above named person has been granted necessary research approval by the National Commission for Science, Technology and Innovation (NACOSTI) to conduct research in Laikipia County. The research topic is: “**Community Land Management Systems and Biodiversity Conservation in Laikipia County, Kenya**” for the period ending 23<sup>rd</sup> July, 2025.

Kindly extend to him all the necessary support that he may require from your office.

  
M. M. MBATHA, MBS  
COUNTY COMMISSIONER  
**LAIKIPIA**