



NATIONAL CRIME RESEARCH CENTRE

Fighting Crime through Research



ENVIROMENTAL CRIMES AND THREATS TO FOREST ECOSYSTEM IN KENYA



Steve Wakhu Khaemba



ENVIROMENTAL CRIMES AND THREATS TO FOREST ECOSYSTEM IN KENYA

COPYRIGHT

Copyright© 2025 by National Crime Research Centre

Nairobi; Printed in Kenya

Part of this publication may be copied for use in research and education purposes provided that the source is acknowledged. This publication may not be re-produced for any other purposes without prior written permission from the National Crime Research Centre.

Table of Contents

LIST OF TABLES.....	6
LIST OF FIGURES.....	7
FOREWORD.....	8
ACKNOWLEDGEMENT.....	9
ACRONYMS AND ABBREVIATIONS	10
DEFINITION OF KEY TERMS.....	11
CHAPTER ONE: INTRODUCTION	14
1.1. BACKGROUND OF THE STUDY	14
1.2. STATEMENT OF THE PROBLEM	15
1.3. OBJECTIVES OF THE STUDY	16
1.3.1. General Objective.....	16
1.3.2. Specific Objectives	16
1.4. JUSTIFICATION OF THE STUDY	16
1.5. SCOPE OF THE STUDY	17
1.6. CONCEPTUAL FRAMEWORK.....	18
CHAPTER TWO: METHODOLOGY OF THE STUDY	20
2.1. INTRODUCTION	20
2.2. RESEARCH DESIGN	20
2.3. STUDY LOCATION	20
2.4. POPULATION AND SAMPLE	21
2.5. DATA COLLECTION AND MANAGEMENT	22
2.6. DATA ANALYSIS.....	23
2.7. ETHICAL CONSIDERATIONS	24
CHAPTER THREE: RESULTS AND DISCUSSION.....	25
3.1. INTRODUCTION	25
3.1.1. Social Demographic Characteristics of Respondents	25
3.1.2. Patterns of Forest Crimes and Threats to Forest Ecosystems.....	26
3.1.3. Drivers of Forest Crimes and Threats to Forest Ecosystems	30
3.1.4. Time of Occurrence of Illegal Forest Activities	31
3.1.5. Actors and Flow Processes in Forest Offences Chain.....	33
3.1.6. Responses to Forest Crimes and Threats to Forest Ecosystems.....	41
3.1.7. Challenges Affecting Responses to Crimes and Threats to Forest Ecosystems.....	43
CHAPTER FOUR: SUMMARY OF FINDINGS AND RECOMMENDATIONS	47
4.1. INTRODUCTION	47
4.2. SUMMARY OF MAJOR FINDINGS	47
4.3. CONCLUSIONS	49
4.4. KEY POLICY RECOMMENDATIONS	49
APPENDIX A: COMMUNITY SURVEY QUESTIONNAIRE	56
APPENDIX B: KEY INFORMANT INTERVIEW GUIDE FOR KFS/KWS/ NGO/CBO	68
APPENDIX C: KEY INFORMANT INTERVIEW GUIDE FOR NGAO/NPS/COUNTY LAW ENFORCEMENT	69
APPENDIX D: KEY INFORMANT INTERVIEW GUIDE FOR KPA/KAA.....	70

APPENDIX E: KEY INFORMANT INTERVIEW GUIDE FOR KRA.....	71
APPENDIX F: KEY INFORMANT INTERVIEW GUIDE FOR JUDICIARY	72
APPENDIX G: FOCUS GROUP DISCUSSION GUIDE.....	73

LIST OF TABLES

Table 1 Location of Study	21
Table 2 Study Sample	22
Table 3 Social Demographic Profile of Respondents	25
Table 4 Prohibited forest activities by proportion of mention and counties with highest prevalence.	27
Table 5 Other crimes associated with prohibited forest activities by proportion of mention and counties with highest prevalence.	28
Table 6 Most targeted forest products by species and county.....	29
Table 7 Drivers of forest crimes by prevalence and county	30
Table 8 Perpetrator categories of forest crimes	34
Table 9 Buyer Actor Connections By Strength of Relationship (edge list)	36
Table 10 Perpetrator Actor Connections By Strength of Relationship (edge list)	38
Table 11 Comparative Effectiveness of Forest Protection by Stakeholder Type.....	42
Table 12 Challenges Affecting Responses to Forest Crimes	45

LIST OF FIGURES

Fig 1 Policy Process for Addressing Crimes and Threats to Forest Ecosystems in Kenya	18
Fig. 2 Time Forest Crimes Are Mostly Committed	31
Fig. 3 Mode of Transport for Illegal Forest Products	33
Fig. 4 Mode of Trade for Illegal Forest Products.....	33
Fig. 5 Buyers Categories of Illegal Forest Products	35
Fig. 6 Buyer Actor Network	37
Fig 7 Perpetrator Actor Network.....	39
Fig. 8 Effectiveness of Forest Protection Measures	41
Fig. 9 Likelihood of Reporting Forest Crimes.....	43
Fig. 10 Reasons Forest Crimes Go Unreported	44
Fig. 11 Preferred Medium of Awareness on Forest Crimes	46

FOREWORD

Forests ecosystems are a critical component of Kenya's natural resource, supporting national development through conserving biodiversity, mitigating climate change, regulating water resources, sustaining livelihoods and contributing to overall economic growth. However, forest ecosystems continue to face significant threats from illegal activities, involving logging, charcoal production, land encroachment, and other traditional as well as non traditional forms of environmental crime. These practices corrode the ecological health of forests, threaten human security, and limit the country's capacity for sustainable development.

Addressing such crimes requires an evidence-based response, informed by reliable research and data. This report on "Environmental Crimes and Threats to Forest Ecosystem in Kenya" therefore provides a timely and comprehensive analysis of the nature, actors, and drivers of forest-related crimes in Kenya. The findings and recommendations presented herein will inform ongoing reforms in environmental governance, support the enforcement of relevant laws and policies, and reinforce Kenya's commitments under regional and international environmental frameworks.

Protecting our forests is not only an environmental imperative but also a national priority for the security, prosperity, and well-being of present and future generations. It is therefore my sincere hope that this report will serve as a valuable resource to policymakers, enforcement agencies, development partners, and other stakeholders dedicated to safeguarding Kenya's forest ecosystems.

**HON. DORCAS A. ODUOR, SC, OGW, EBS
ATTORNEY GENERAL /CHAIRLADY
GOVERNING COUNCIL
NATIONAL CRIME RESEARCH CENTRE**

ACKNOWLEDGEMENT

The National Crime Research Centre acknowledges with gratitude the invaluable contributions that made this report possible. We particularly thank the Government of Kenya for providing the necessary funding.

We extend sincere appreciation to the Centre's Governing Council, led by Hon. Dorcas A. Oduor, SC, OGW, EBS, for its strategic leadership and policy direction, and to the Research and Development Committee, chaired by Mr. Samuel Wakanyua, for its professional guidance throughout the study.

We are grateful to our stakeholders for their input during the preparatory methodology workshop, to the respondents who shared their insights, and to the research supervisors, assistants, and the Kenya Forest Service team for ensuring the collection of quality data.

Special thanks go to Dr. Steve Wakhu Khaemba, the lead researcher and author of this report.

Finally, we acknowledge with appreciation all others who contributed in various ways to the success of this study.

DR. MUTUMA RUTEERE
DIRECTOR/CEO
NATIONAL CRIME RESEARCH CENTRE

ACRONYMS AND ABBREVIATIONS

ASALs	Arid and Semi-Arid Lands
AUA	Africa Union Agenda 2063
BETA	Bottom-up Economic Transformation Agenda
CBD	Convention on Biological Diversity
CCF	Chief Conservator of Forests
CoK	Constitution of Kenya
FAO	Food and Agriculture Organization
FCMA	Forest Conservation and Management Act, 2016
FoLEA	Forest Law Enforcement Academy -
GDP	Gross Domestic Product
GOK	Government of Kenya
KFS	Kenya Forest Service
KWS	Kenya Wildlife Service
MDAs	Ministries, Departments, Agencies
MEAs	Multinational Environmental Agreements
MECCF	Ministry of Environment, Climate Change and Forestry
NFP	National Forest Programme
PESTELE	Political, Economic, Social, Technological, Environmental, Legal, Ethics
SCP	Situational Crime Prevention
SDGS	Sustainable Development Goals
SNA	Social Network Analysis
UNCCD	United Nation's Convention to Combat Desertification.
UNFCC	United Nations Framework Convention on Climate Change

DEFINITION OF KEY TERMS

Biodiversity	The variability among living organisms from all sources including the ecological complexes of which they are part, and the diversity within and among species, and ecosystems.
Community Forest Association	A group of local persons who have registered as an association or other organization established to engage in forest management and conservation jointly with the Kenya Forest Service (KFS) in accordance with the provisions of the Forest Conservation and Management Act 2016.
Deforestation	The conversion of forested area to other land uses irrespective of whether it is human induced
Forest Cover	Refers to a land area of more than 0.5ha with a canopy cover of at least 15%, a minimum tree height of 2 meters which is not primarily under agricultural or other specific non- forest land use
Forest Ecosystem	A dynamic complex of plant, animal, and microorganism communities and their non-living environment interacting as a functional unit.
Forest Produce	Includes bark, animal droppings, beeswax, canes, charcoal, creepers, earth, fibre, firewood, frankincense, fruit, galls, grass, gum, honey, leaves, flowers, limestone, moss, murram, soil, myrrh, peat, plants, reeds, resin, rushes, rubber, sap, soil, seeds, spices, stones, timber, trees, water, wax, withies, and such other things as may be declared by the Cabinet Secretary to be forest produce for the purpose of the Forest Conservation and Management Act.
Indigenous Forest	Means a forest which has come about by natural regeneration of trees primarily native to Kenya;
Plantation Forest	A forest that has been established through afforestation or

reforestation for commercial purposes.

Water Tower

Forested areas that form the upper catchment of rivers in Kenya.

EXECUTIVE SUMMARY

The Government acknowledges the importance of this evidence in guiding interventions aimed at preventing, managing and controlling crimes against forests and protecting forest ecosystems in Kenya. The study highlights the drivers of forest offences; actors and flow processes in forest offences chain; responses to forest crimes and threats to forest ecosystems and identifies challenges affecting responses to forest crimes and threats to forest ecosystems.

It finds that poverty, lack of livelihoods and expansion of the construction industry which provides a ready market for forest products, are the top drivers of forest crimes. Indigenous tree species are the most targeted products. The study also finds that forest crimes are committed by a tightly-knit network of individuals, small businesses, corrupt government officials, local community groups, criminal groups and local leaders. With individuals playing the most central role, in multiple positions as suppliers, consumers and middlemen. The main challenge affecting responses to environmental crimes and threats to forest ecosystems is non reporting and underreporting of crimes. However, Policy & regulatory frameworks; reforestation and law enforcement are perceived to be the most effective measures for the protection and conservation of forest ecosystems in Kenya. In addition, the Kenya Forest Service is considered to be the most trusted and visible government actor in the protection of forest ecosystems in Kenya.

Recognizing the strategic importance of forest ecosystems to Kenya's sustainable social-economic development, the study makes several key policy recommendations among them: promoting alternative income sources and livelihoods for individuals and households living adjacent to forest ecosystems; strengthening forest governance and law enforcement including anti-corruption mechanisms; enhancing community awareness on the importance of forest ecosystems; improving data collection, sharing and research; disrupting criminal networks operating in the market for illegal forest products and incorporating communities and local leaders in the forest management structure including requiring that political actors commit to political and criminal accountability for the protection of forest ecosystems.

CHAPTER ONE: INTRODUCTION

1.1. Background of the Study

The forest ecosystem in Kenya is made up of 7,180,000.66 Ha (12.13%) of tree cover and 5,226,191.79 Ha (8.83%) of forest cover (Filardi, 2020; Muthike & Githiomi, 2020; Ototo & Vlosky, 2018; Service, 2021; Wanyanga, 2021). The forest cover consists of natural forests and forest plantations. Natural forests form 84% of the closed forest canopy, categorized into montane forests, western rainforests, coastal forests, and dryland forests (Ototo & Vlosky, 2018; Service, 2021; Wanyanga, 2021). Montane forests, primarily Mt. Kenya, Aberdare Range, Mau Forest Complex, Mt. Elgon, and Cherangani Hills are the primary montane types and are popularly known as the “Five Water Towers” regulating more than 75 percent of the country’s renewable water resources (Ajwang, 2023; Kuto, 2020; Muhati, 2022; Ototo & Vlosky, 2018; Rotich et al., 2022; Rouillé-Kielo, 2021). Natural forests, dominated by mixed indigenous forests and bamboo dominated forests, are biologically rich and contain a high concentration of endemic plant and animal species (Ototo & Vlosky, 2018). Forest plantations are categorized into state-owned plantations (approximately 136,000 ha) or private forest plantations (approximately 100,000 ha) and predominantly consist of Pines and Cypress (86%), Eucalyptus (10%), indigenous hardwood and softwood plantations (Mwambeo et al., 2020; Ngome Chisika & Yeom, 2020; Ototo & Vlosky, 2018). State owned forests are managed by the Kenya Forest Service (KFS), with some areas managed as national parks and game reserves by the Kenya Wildlife Service (KWS), while a smaller area falls under the authority of local governments (Ototo & Vlosky, 2018; Tebkew & Atinkut, 2022; Wanjiru, 2022). Privately owned forests are mainly grown by trained and contract farmers under an arrangement known as out-grower schemes on woodlots, boundary planting, avenue planting and also scattered on community land (Mwambeo et al., 2020; Ototo & Vlosky, 2018). Electricity, tea and tobacco industries are among the leading investors in private plantations for posts, transmission and building poles, sawn timber and fuelwood to dry their products (Namaswa et al., 2022; Ototo & Vlosky, 2018).

There are numerous benefits for the country that accrue from forest ecosystems. Kenya's, forest sector makes up to 13% of the gross domestic product (GDP), while providing decent employment and income for more than 18.12 million people (Eregae et al., 2023; Imarhiagbe et al., 2022; Kinyili, 2022; Lippe et al., 2021; Maina, 2021; Mwangi et al., 2020; Ndegwa et al., 2020; Ojunga et al., 2023; Service, 2023). Further, forests constitute the main source of herbal or traditional medicine, meeting the health needs of more than 70% of people who use local home-made remedies as their first source of medicine (Gakuya et al., 2020; Mbuni et al., 2020; Ojunga et al., 2023). The country consumes approximately 34.3 million tons of biomass for fuel wood with communities adjacent forests deriving about 80% of their building and biomass energy requirements from forests (Kinyili, 2022; Kiruki et al., 2020; Muthike & Githiomi, 2020; Riungu et al., 2022). Out of this, charcoal alone is estimated to contribute about 20% of the household income (Kiruki et al., 2020; Mutta et al., 2021; Ndegwa et al., 2020). In addition, forest cover provides carbon sinks for carbon sequestration - the capturing carbon from the atmosphere through photosynthesis and storing it in biomass and soil - which is often identified as a solution for the adverse effects of climate change (Langat et al., 2021; Maina, 2021; Reppin et al., 2020; Service, 2023; Tarus & Nadir, 2020).

1.2. Statement of the Problem

Despite the benefits that accrue from forest ecosystems, Kenya's total forest cover falls short of the minimum constitutional threshold of 10%, is being lost and degraded at a rate of 1-2% per year (Kiruki et al., 2020; Riungu et al., 2022) and continuously threatened by environmental crime. Particularly, forest crime which is the illegal exploitation of high-value endangered flora species such as rosewood, sandalwood, red cedar (*Juniperus procera*), which includes taking, trading (supplying, selling or trafficking), importing, exporting, processing, possessing, obtaining and consuming wild flora in contravention of national or international law (ENACT, 2023; Kioko, 2022; Kioko & Kinyanjui, 2023; Nduguta et al., 2024; Okumu, 2022; UNODC, 2024). Tree species such as Sandalwood, Red Cedar (*Juniperus procera*) and Eucalyptus veneer are increasingly facing the threat of extinction due to illegal harvesting and trafficking. According to the Africa Organised Crime Index (ENACT, 2023), Kenya has a high criminality index of 6.0 for flora crimes which is above the region's overall criminality index of 5.88.

However, our capacity to address this problem is hindered by lack of reliable research and data to guide policy and law enforcement. This lack of data and research is disturbing given that plants constitute a large percentage of the species protected by the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)¹. Generally, the criminological status of forest flora in Kenya remains poorly understood and documented, hence undermining the design of targeted interventions.

1.3. Objectives of the Study

1.3.1. General Objective

To explore the nature, actors, and drivers of environmental crimes and threats to forest ecosystem in Kenya

1.3.2. Specific Objectives

- i.) Investigate the drivers of forest offences
- ii.) Analyse the network of actors and flow processes in forest offences chain
- iii.) Examine responses to forest crimes and threats to forest ecosystems
- iv.) Identify challenges affecting responses to forest crimes and threats to forest ecosystems

1.4. Justification of The Study

The findings of this study inform, from an empirical basis, the design of strategies and policies aimed at to reducing illegal exploitation of forest flora in Kenya. Further, the study contributes towards the achievement several strategic objectives outlined in key legislative and policy frameworks guiding Kenya's sustainable development. These include but not limited to the Constitution of Kenya 2010, Vision 2030, the Fourth Medium Term Plan (MTP) (2023-2027), the Ministry of Environment, Climate Change and Forestry Strategic Plan (2023-2027), the Forest Conservation and Management Act, 2016, Bottom-up Economic Transformation

¹ See <https://cites.org/eng>.

Agenda (BETA)², the Forest Policy Sessional Paper No.4 of 2006, the National Forest Program (NFP) (2016-2030) and the National Strategy for achieving 30% tree cover by 2032, the National Landscape and Ecosystem Restoration Strategy (2023 – 2032), The National Forest Policy, 2023, The National Agriculture Policy 2021, the County Government Act, 2012 and other public priorities. Internationally, the study will contribute to the achievement of Kenya's targets in global agendas such as the Sustainable Development Goals (SDGs), particularly SDGs No. 2, 6, 13, 14 & 15, Africa Union Agenda 2063, the African Convention on the Conservation of Nature and Natural Resources treaty³, the East African Community Vision 2050, the Paris Agreement, the United Nations Strategic Plan for Forests 2030, the Convention on Biological Diversity, the United Nations Convention to Combat Desertification, among others. By employing social network analysis (SNA), the study provides information that promotes systematic, intelligence led action against actors and informal social networks engaged in forest offenses. Understanding how these criminal networks work, the characteristics of key actors and the nature of relationships between actors, is essential to planning how to efficiently and effectively disrupt the networks.

1.5. Scope of the Study

The study was limited to crimes and threats to forest ecosystems in Kenya, specifically those crimes that target flora species. It was not a national survey, rather an analyses and interpretation of findings was based on a representative sample of carefully selected forest ecosystems in 15 counties. In addition, due to the value of natural forest ecosystems to Kenya's social economic development, the study was limited to natural forests and no data was collected from forest plantation ecosystems.

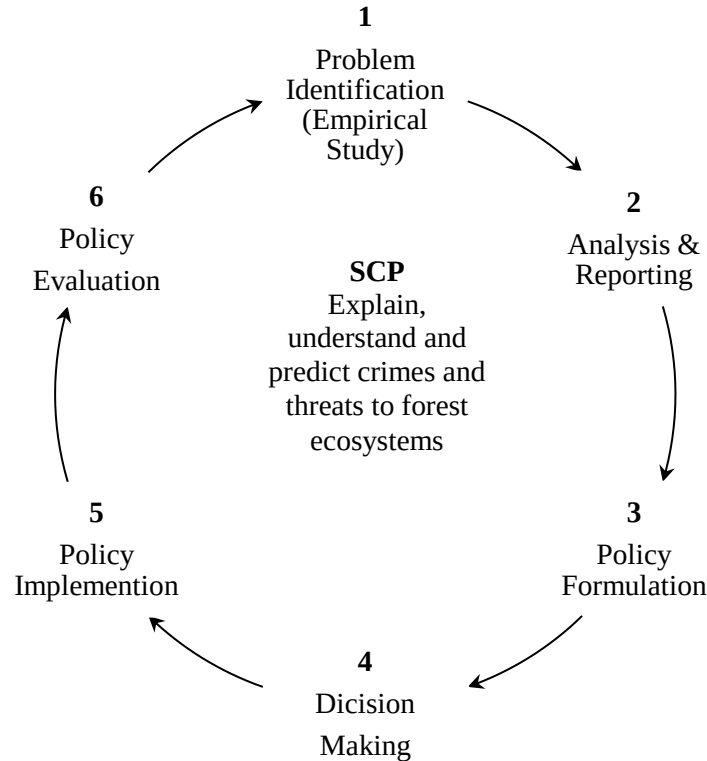
² BETA commits to establish 5m acres (20,000 km²) agro- forestry woodlots in drylands and reduce Green House Gas (GHG) emissions by 32 percent by 2030.

³ See [African Convention on the Conservation of Nature and Natural Resources | African Union \(au.int\)](https://www.aunet.org/african-convention-on-the-conservation-of-nature-and-natural-resources)

1.6. Conceptual Framework

Based on an integration of situational crime prevention (SCP) theory, first advanced by Clarke (1980) and others (Gluszek et al., 2022; Lavorgna et al., 2018) within the traditional structure of the policy cycle, the conceptual framework in figure 1 illustrates the analytical lens through which environmental crimes and threats to forest ecosystems can be examined and policy solutions to the problem devised. Situational prevention seeks to reduce opportunities for crime by increasing the associated risks and difficulties and reducing the rewards (Clarke, 1995).

Fig 1 Policy Process for Addressing Crimes and Threats to Forest Ecosystems in Kenya



Public policy (criminal justice policy) is a cyclical process that begins with or includes empirical research. The direction of the arrows indicate the various stages in the policy process designed to address crimes and threats to forest ecosystems in Kenya. In this case, the process starts with this empirical study in stage one (1) where different crimes against forest ecosystems are studied to identify the actors, their relationships, the opportunities for committing the crimes and ways of increasing the associated risks, difficulties and reducing the rewards for committing the crimes.

In the second (2) stage, the data collected is analysed, interpreted and the findings reported/disseminated in a form that enables policy makers to clearly understand the problem at hand. In stage three (3) relevant stakeholders in the forest protection and management chain, having understood the results of the study, the conclusions derived and recommendations made, formulate various policy and practical strategies for preventing, controlling and managing crimes and threats to forest ecosystems. In 'stage four (4)' key issues and alternative responses to the problem are presented (cabinet memo, policy paper, legal framework etc.) to relevant authorities (cabinet, parliament, core ministries, partner agencies etc.) for decision making and allocation of resources. In the fifth (5) stage, preferred policy alternatives to solving the problem are implemented in a participatory, multi agency and multi sectoral approach, in which local communities, especially those bordering forest ecosystems, play a central role in the implementation process. Finally, in stage six (6), evaluation of specific policy intervention is carried out to establish the immediate negative and positive outcomes as well as projected long term impacts. This includes establishing possible negative and positive externalities that might affect forest ecosystems and or local populations co-existing with those ecosystems. Such evaluation should incorporate a continuous monitoring and evaluation (M&E) mechanisms that also includes significant elements of local participation. Monitoring should also include regular analysis of forest crime data to establish emerging trends and patterns. If well done, results of M&E might suggest modifications to certain policy measures or highlight the need to develop new policy interventions. If the latter is the case, it might be necessary to begin the process again with well designed and funded empirical studies. Such studies should be informed by the gaps highlighted by M&E, guided by clear research objectives, answer specific policy questions and rely on a triangulation of methods. In cases where, interventions are implemented within the framework of specific programmes or projects, action research can offer powerful methodologies for combining the policy process and empirical research, including for academic purposes.

CHAPTER TWO: METHODOLOGY

2.1. Introduction

This chapter describes the research design, location of the study, the study population and sample, data collection and analysis methods, as well as ethical considerations for the study.

2.2. Research Design

The study adopted a cross sectional survey research design based on a mixed methods analytical strategy.

2.3. Study Location

Primarily, the study was located within existing gazetted or documented forest ecosystems broadly categorized as natural forests (montane forests, western rainforests, coastal forests, and dryland forest) and intensively managed forest plantations (Ototo & Vlosky, 2018). Because the study was not a national survey, and considering the need for a representative sample, the study was carried out in fourteen (14) counties representing about 30% of the national forest ecosystem. The final selection of counties took into consideration the forest type and forest cover per capita (m²/person). Since crime statistics on flora is scarce, the level of crime was not considered in the final selection of the study location. See table 3 for the sampled study locations.

Table 1 Location of Study

County	Population	Forest Cover (Ha)	Forest Cover (%)	Forest Cover per Capita (m ² /Person)	Forest Type
1. Kilifi	1,453,787	328,272.37	26.25	2,258.05	Coastal
2. Lamu	143,920	197,299.53	32.13	13,708.97	Coastal
3. Taita Taveta	340,671	58,448.54	3.41	1,715.69	Coastal
4. Samburu	310,327	489,558.44	23.29	15,775.57	Drylands
5. Tana River	315,943	390,241.90	9.97	12,351.66	Drylands
6. Turkana	926,976	689,467.59	9.77	7,437.81	Drylands
7. Narok	1,157,873	251,421.32	14.01	2,171.41	Montane
8. Laikipia	518,560	94,399.98	9.89	1,820.43	Montane
9. Nyeri	759,164	136,416.25	40.89	1,796.93	Montane
10. Elgeyo Marakwet	454,480	61,952.34	20.53	1,363.15	Montane
11. Bomet	875,689	57,180.60	24.28	652.98	Montane
12. Bungoma	1,670,570	47,170.27	15.55	282.36	Montane
13. Nandi	885,711	47,516.40	16.69	536.48	Western
14. Kakamega	1,867,579	21,075.59	6.97	112.85	Western

Source: (KNBS, 2019; Ototo & Vlosky, 2018; Service, 2021)

The proportion of montane forests ecosystems was higher in the sample because of their relative importance to Kenya's water security. See Ajwang (2023); Kuto (2020); Muhati (2022); Ototo and Vlosky (2018); Rotich et al. (2022); Rouillé-Kielo (2021)

2.4. Population and Sample

The total population in the sampled counties was approximately 10,287,001 and the sampling unit was the household. Slovin's formula was used to determine the sample size for the community survey:

$$n = \frac{N}{1 + Ne^2}$$

Where:

n: sample size

N: total number of households in the 14 sampled counties

e: margin of error (0.03)

Thus:

$$n = \frac{2,648,912}{1 + (2,648,912 \times 0.03^2)}$$

n = 1,111 households.

The final sample size for each forest ecosystem was computed as a proportion of the total sample size of 1111 obtained from Slovin's formula. Table 6 presents the final sample size by forest ecosystem and method of data collection.

Table 2 Study Sample

County	Population*	Households*	Sample Size		
			KII	FGD	Community Survey
1. Kilifi	1,453,787	298,472	4	1	125
2. Lamu	143,920	37,963	4	1	16
3. Taita Taveta	340,671	96,429	4	1	40
4. Samburu	310,327	65,910	4		28
5. Tana River	315,943	68,242	4	1	29
6. Turkana	926,976	164,519	4	1	69
7. Narok	1,157,873	241,125	4	1	101
8. Laikipia	518,560	149,271	4	1	63
9. Nyeri	759,164	248,050	4	1	104
10. Elgeyo Marakwet	454,480	99,861	4	1	42
11. Bomet	875,689	187,641	4	1	79
12. Bungoma	1,670,570	358,796	4	1	150
13. Nandi	885,711	199,426	4	1	84
14. Kakamega	1,867,579	433,207	4	1	182
15. Nairobi/Kiambu	4,397,073	-	30	-	-
Total	11,681,250	2,648,912	86	14	1111

Note: *(KNBS, 2019; Ototo & Vlosky, 2018; Service, 2021)

2.5. Data Collection and Management

Field research was implemented by triangulation to obtain original empirical data. Anonymous semi-structured key informant interviews (KIIs) and focus group discussions (FGDs) provided information and data on the types, levels and patterns of flora crime and threats to forest ecosystems in Kenya as well as the actors and flow processes involved. In addition, KIIs and

FGDs also provided data on the existing and potential interventions to address the problem and challenges faced. For a more standardized comparison of different perceptions on forest crimes and threats to forest ecosystems in Kenya, the information obtained from the KIIs and FGDs was complemented by small community-based surveys to obtain fine-grained data on variations in individuals' attitudes, views and opinions. Community surveys also generated information on the role of the community in the protection and security of forest ecosystems, including the application of cultural epistemologies. To smoothly implement the collection of primary data, the researchers approached relevant government agencies, non-governmental organizations, community leaders, political leaders, subject experts and academic institutions during the preparatory stage of the field research. This established rapport, support relationships, collaboration and networking prior to field visits for data collection. Categories of participants for KIIs and FGDs were drawn from the Kenya Forest Service Strategic Plan 2023 – 2027 (Service, 2023). Competent teams of research assistants were identified, trained and dispatched to collect data from the carefully selected study locations. In addition, all collected primary data was handled with absolute care, privacy, confidentiality, and used only for the purpose of this study. All data will be securely stored for at least ten years (e.g. as stipulated by Code of Conduct of NCRC and University of Embu).

2.6. Data Analysis

Before analysis, all collected primary data was cleaned and checked for errors and missing data. A mixed methods analytical approach was employed for the analysis. Namely: quantitative (descriptive and inferential using Statistical Package for Social Scientists (SPSS) and Microsoft Excel) and qualitative (thematic coding and analysis using MAXQDA). To investigate key actors, their networks and processes, social network analysis (SNA) was employed using the Social Network Visualizer (SocNetV) which is a cross-platform and user-friendly open source software application. SNA is a set of theories, methods, techniques and software used to study social relational structures i.e. networks created by social interactions between individuals and groups (Costa, 2020; Marin & Wellman, 2011; Oliveira & Gama, 2012; Tabassum et al., 2018; Wasserman, 1994).

2.7. Ethical Considerations

The study observed the scientific and ethical standards governing the conduct of research. Specifically, this included:

- i. Authority to collect data was sought from relevant institutions before the commencement of this study.
- ii. Establishing local contacts and relationships before the start of primary data collection in the field ensured that the study avoided adverse exposure for both researchers and research subjects.
- iii. An informed consent was established to guarantee confidentiality and ensure that participants understood the purpose of the study, its benefits and associated risks.
- iv. Recording and transcription of interviews and focus group discussions was only done with the explicit consent of the participants.
- v. Data was collect anonymously – no personal identifiable information was collected. Primary data was handled with absolute care, privacy, confidentiality, and used only for the purpose of this study.
- vi. Respect for diversity with regard to opinions and experiences was upheld in the course of this study.
- vii. Importantly, the researchers were fully aware of the ethical implications and dilemma confronting criminological research as discussed by Israel et al. (2011); Scott (2018) and Vohryzek-Bolden (1997). Thus, precaution was undertaken by the research teams while in the field, including security briefs from relevant agencies.

CHAPTER THREE: RESULTS AND DISCUSSION

3.1. Introduction

This chapter thematically presents the results from analysis of the data based on a survey of 1,111 households, 14 focus group discussions and key informant interviews across the fourteen (14) counties.

3.1.1. Social Demographic Characteristics of Respondents

The respondents were fairly distributed in terms of gender. Fifty five percent 55% were male and forty five percent 45% were female. Majority of the respondents (43%) were aged between 35-51 years, with primary education (42%) as the highest level, married (79%) and subsistence farmers (70%).

Table 3 Social Demographic Profile of Respondents

Characteristic	Description	% of total
Sex	Male	55%
	Female	45%
Age category of respondent	18-34	25%
	35-51	43%
	52+	32%
Marital status	Single/Never Married	11%
	Married	79%
	Separated	2%
	Divorced	1%
	Widowed	7%
Level of education	None	18%
	Primary	42%
	Secondary	26%

	Middle-level college	10%
	University	4%
	Adult literacy	1%
Occupation	Permanent employment – Private Sector	1%
	Permanent employment – Public Sector	4%
	Casual/temporary employment- Private Sector	7%
	Casual/temporary employment- Public Sector	1%
	Businessperson	14%
	Subsistence farming	70%

Source: Field work data, 2025

3.1.2. Patterns of Forest Crimes and Threats to Forest Ecosystems

The three most prevalent threats to forest ecosystems in Kenya as identified by respondents are illegal logging (84%), extraction of forest resources for domestic energy use (66%) and extraction for medicinal and aesthetics use (48%). The pressure of exploitation of indigenous and medicinal plant species is important to note, especially because forests constitute the main source of herbal or traditional medicine, meeting the health needs of more than 70% of people who use local home-made remedies as their first source of medicine (Gakuya et al., 2020; Mbuni et al., 2020; Ojunga et al., 2023). Globally, it is estimated that natural forest products, as well as their derivatives, contribute up to 50 % of all drugs used in clinical medicine (Gakuya et al., 2020). A commonly known example is aspirin, which is obtained from the willow tree (UNODC, 2024). Important to note also is that, though some practices are illegal such as grazing, they do not pose a significant threat to forest ecosystems and may in fact contribute to enhancing household incomes of families living adjacent to forests. Such practices can be encouraged sustainably. For example, stingless beekeeping (meliponiculture) would be ideal for generation of supplementary income to resource-poor farmers around forests, in addition to conservation of stingless bees (Macharia et al., 2007).

Table 4 presents the prevalence of prohibited forest activities by proportion of mention and counties with highest prevalence.

Table 4 Prohibited forest activities by proportion of mention and counties with highest prevalence.

Prohibited Activity	% of Total	County With Highest Prevalence
Logging	84%	Lamu, Taita Taveta, Elgeyo Marakwet
Extraction for domestic energy use	66%	Elgeyo Marakwet, Nandi
Extraction for medicinal and aesthetics use	48%	Lamu
Trespassing into forests	47%	Bomet
Grazing	47%	Lamu
Arson	27%	Taita Taveta
Forest conversion (farming)	26%	Bomet
Soil, sand and marram harvesting	17%	Samburu
Extraction for food and nutritional use	16%	Elgeyo Marakwet
Extraction of grass	14%	Kakamega
Land grabbing	10%	Samburu
Littering and pollution	8%	Lamu
Mining(marram, stones, minerals)	6%	Nyeri
Disposal of dead bodies	6%	Nyeri
Extraction for cultural use	5%	Samburu

Source: Fieldwork data, 2025

Overall, the data suggests that Lamu, Taita Taveta, Elgeyo Marakwet, Nandi and Nyeri appear to be the hot spots of the most serious crimes and threats to forest ecosystems in Kenya. The prevalence of disposal of dead bodies in forests in Nyeri county should be a cause of concern for the National Police Service (NPS), particularly the Directorate of Criminal Investigations (DCI). This could suggest a relatively higher incidence of homicide related crimes in Nyeri and adjacent counties.

When asked what were the most prevalent other criminal activities linked to crimes and threats to forest ecosystems in their localities, corruption (51%), banditry and cattle rustling (38%), and poaching and wildlife trafficking (36%) were identified as the three most prevalent associated

proscribed activities. table 5 shows the prevalence of other crimes associated with prohibited forest activities by proportion of mention and counties with highest prevalence.

Table 5 Other crimes associated with prohibited forest activities by proportion of mention and counties with highest prevalence.

Prohibited Activity	% of Total	County With Highest Prevalence
Corruption	51%	Lamu, Laikipia
Banditry and cattle rustling	38%	Samburu
Poaching and wildlife trafficking	36%	Lamu
Armed robbery	24%	Samburu
Drug trafficking	14%	Lamu
Tax evasion	12%	Turkana
Illegal mining	6%	Nyeri
Illegal cultural and/or religious activities	6%	Bomet
Gang violence	5%	Nyeri
Smuggling of contrabands	4%	Samburu
Forgery of documents	2%	Tana River
Trafficking of weapons	2%	Lamu
Human trafficking	0%	Lamu

Source: Field data, 2025

Consistent with findings of the National Survey on the Status of Drugs and Substance Use in Kenya (NACADA, 2022) showing that Coast region had the highest prevalence of multiple drug use (10.5%) and other studies such as (Kamenderi & Muteti, 2019), drug trafficking was highest in Lamu compared to other counties. Lamu also had the highest prevalence in human trafficking and trafficking of weapons. These findings suggest that the expansive Boni forest whose largest part is found in Lamu could be providing cover for organised criminal groups engaged in various forms of organised criminal enterprises including terrorism which is mainly perpetrated by the Somali based al shabaab terror group. Trafficking of weapons is also relatively high in Samburu

(14%) and Turkana (19%) indicating the possibility that bandits use forests as safe havens for trade in small arms and mobilisation. The policy implication is that agencies concerned particularly with terrorism, namely the Kenya Defense Forces, the National Counterterrorism Center should pay more attention on activities such as human trafficking and arms smuggling taking place within forest ecosystems and which could be used by terrorist groups to generate income for operational purposes.

Overall, most crimes and threats to forest ecosystems appear to target indigenous forest species, mainly trees (74%) but also shrubs for medicinal purposes (43%). Table 6 presents the most targeted forest products by species and county

Table 6 Most targeted forest products by species and county

Targeted species	% of Total	County With Highest Prevalence
Indigenous Species	74%	Lamu
Shrubs for herbal medicine	43%	Turkana
Cypress	31%	Laikipia
Red Cedar (<i>Juniperus procera</i>)	28%	Samburu
Eucalyptus	21%	Taita Taveta
Pine	16%	Taita Taveta
Mangrove (Mikoko)	7%	Tana River
Sandalwood	4%	Samburu
Bamboo (Mianzi)	4%	Elgeyo Marakwet
Rosewood	2%	Elgeyo Marakwet

Source: Field data, 2025

Some of the indigenous species mostly targeted include, Mbamba kofi, Elgon teak, *Prunus Africana*, *Olea Africana*, *Segawetet*, *Podocarpus latifolius*. Other studies have also establish similar findings. For example, Nduguta et al. (2024) found out that *Juniperus procera*, *Arundinaria alpina*, and *Podocarpus latifolius/glacilior* were the top three vulnerable trees species

to illegal logging. The implications of this findings are that the Kenya Forest Service (KFS) and to some extent Kenya Forestry Research Institute (KEFRI) should do more to protect and regenerate indigenous flora species from illegal threats.

3.1.3. Drivers of Forest Crimes and Threats to Forest Ecosystems

Poverty coupled with lack of alternative livelihoods were mentioned by respondents as the key drivers of crimes and threats to forest ecosystems in Kenya. Table 7 presents the drivers of forest crimes by prevalence and county.

Table 7 Drivers of forest crimes by prevalence and county

Driver	% of Total	County With Highest Prevalence
Poverty and lack of alternative livelihoods	92%	Lamu, Taita Taveta, Samburu, Tana River, Turkana, Narok, Laikipia, Nyeri, Elgeyo Marakwet, Bomet, Bungoma
Demand for construction materials	61%	Lamu
Ready markets for forest products	54%	Samburu
Need for herbal medicine	52%	Samburu
Greed for money and wealth	51%	Samburu
Corruption	42%	Laikipia
Lack of adequate land for farming	29%	Bomet
Weak law enforcement and protection of forests	27%	Turkana
Need for food and nutritional value	24%	Turkana
Inadequate community awareness on importance of forest conservation	19%	Turkana
Demand for cultural products and artifacts	9%	Turkana
Lack of designated waste disposal sites	1%	Nyeri

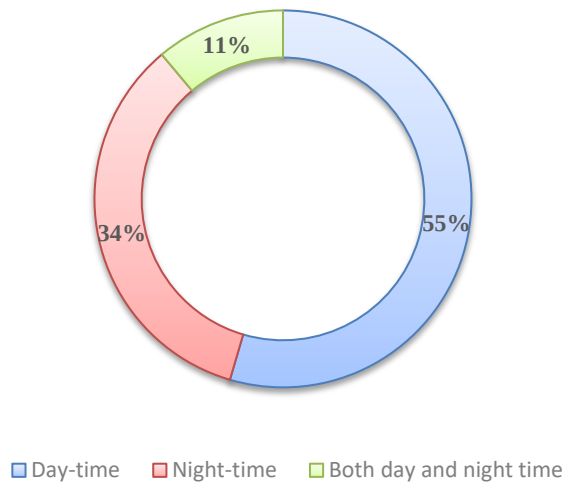
Source: Fieldwork data, 2025

From the data, it appears that Samburu and Turkana and Samburu counties are the most affected in terms of multidimensional drivers for crimes and threats to forest ecosystems. Whereas, the forest cover in the two counties may be comparatively low (23.29% and 9.97% respectively), this findings point to the level of strain that communities in those counties have to endure, threatening their well being and pushing them towards illegal extraction of forest resources for survival. Demand for construction materials (61%) appears to be a significant emerging threat, which is possibly a direct consequence of the expansion within the construction and real estate industry across the country, coupled with rapid population growth and urbanisation. Ready markets for forest products (54%) is a significant incentive for involvement forest crimes at local levels. Corruption (42%) and weak law enforcement (27%) emerged as systemic failures and weakness in forest governance that lower the risk and opportunity cost of engaging in crimes and threats to forest ecosystems. As a driver, lack of land for farming (29%) signals the relevance of population growth and rapid urbanization as factors exerting pressure on shrinking agricultural resources pushing individuals and communities to threaten existing forest ecosystems. Bomet county is the most affected. The dual threat posed by population growth and urbanisation on forest ecosystems, compounded by systematic dismantling of local and indigenous systems and practices of forest resource conservation is well established in existing research (Abdi, 2013; Imo & Imo, 2012).

3.1.4. Time of Occurrence of Illegal Forest Activities

Most prohibited forest activities happen openly during day-time (54%), suggesting that law enforcement in many areas is weak and community acceptance or awareness of the importance of conserving forest ecosystems is poor.

Fig. 2 Time Forest Crimes Are Mostly Committed



Source: Fieldwork data, 2025

Where, illegal forest activities are predominally carried out at night (34%) e.g. Taita Taveta (71%), Tana River (72%), Narok (50%), Laikipia (51%) and Nandi (56%), this is likely because of the need to avoid detection. In such places, either enforcement is stronger or communities exhibit higher levels of acceptance/awareness of the importance of conserving forest ecosystems. In which case, perpetrators at least attempt to conceal their illegal activities. In counties where illegal forest activities significantly occur both during day & night time (11%), e.g. Lamu (33%), Narok (30%) and Nyeri (37%), this could be indicative of vibrant local markets driving higher demand for specific forest products. In addition, both day and night time illegal forest activities could be indicative of the presence of organized criminal enterprises exploiting the market for forest products for profit.

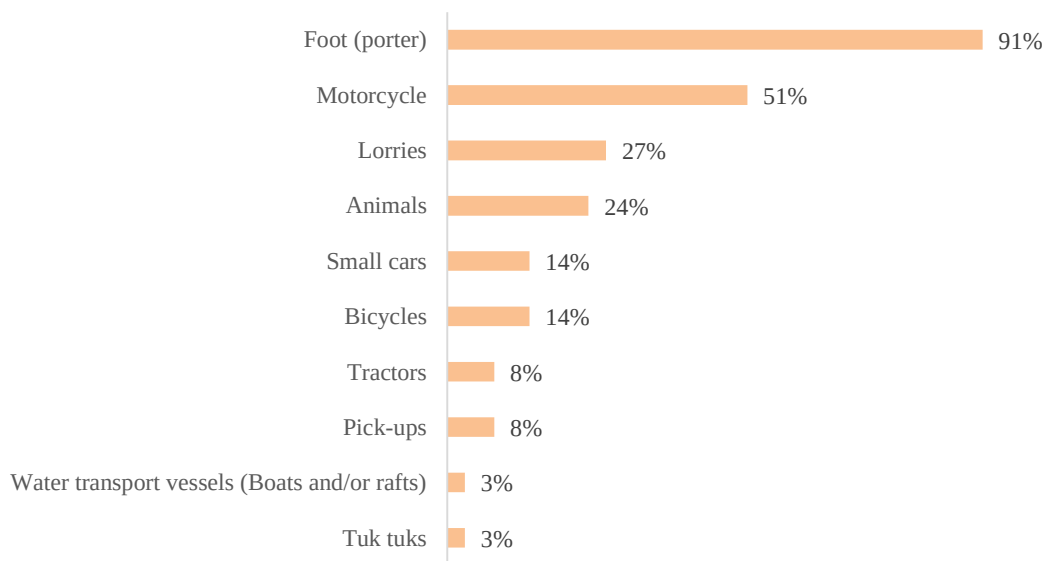
These findings suggest that protection of forests and law enforcement, particularly by KFS should adopt strategies that incorporate community awareness as opposed to patrolling and policing forested areas. Especially in expansive forest ecosystems such as the mau complex. This recommendation is supported by studies such as Dewi et al. (2019) which show that factors that hinder forest policing in the protection of forest ecosystems include: (a) lack of public knowledge about forest functions, as well as applicable laws and regulations concerning forestry; (b) lack of forestry police personnel; (c) lack of budget; (d) communities still consider forest as their main livelihood; (e) lack of supervision from the competent agencies and related agencies;

(f) the involvement of officers who back up the perpetrators of illegal logging. Many of these factors also plague KFS and other relevant enforcement agencies such as county governments.

3.1.5. Actors and Flow Processes in Forest Offences Chain

The most preferred modes of transport are foot/porter (91%) and motorcycles (51%). These modes of transport could be preferred due to their versatility in rough terrains characteristic of most forest ecosystems and their ease of evading law enforcement.

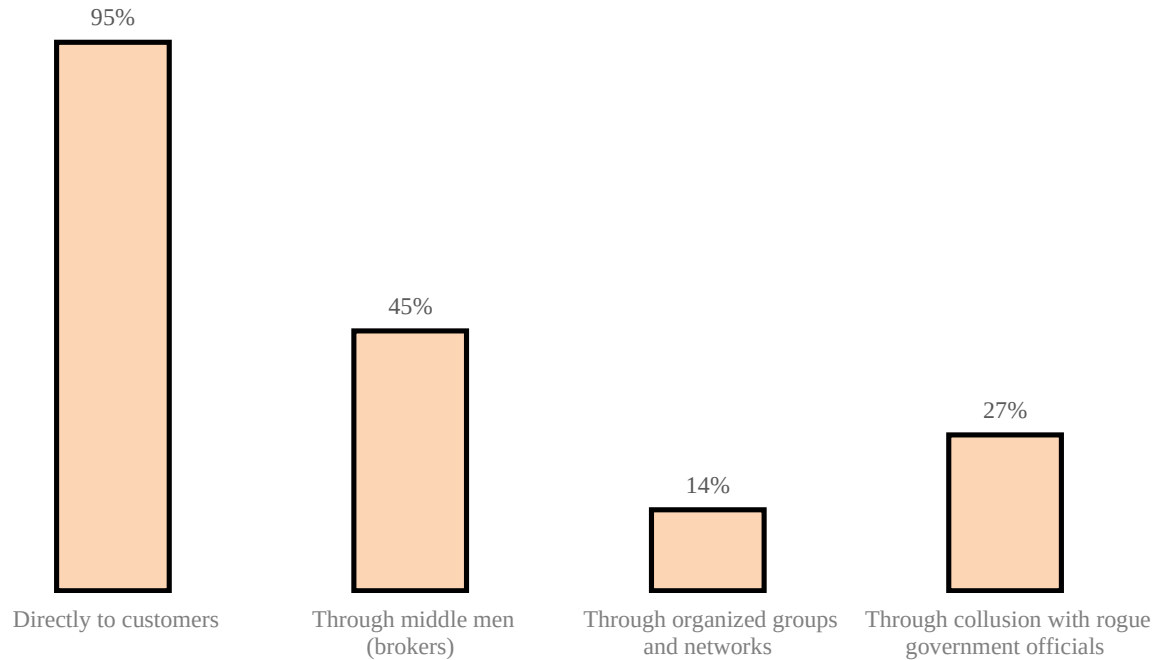
Fig. 3 Mode of Transport for Illegal Forest Products



Source: Fieldwork data,2025

Most prohibited forest products are traded in raw/ unprocessed form (98%), directly to end customers (95%) and through middlemen (45%). This result shows that there exists vibrant informal markets for forest products, at local levels that do not necessarily rely on value addition to shore up demand.

Fig. 4 Mode of Trade for Illegal Forest Products



Source: Fieldwork data, 2025

Particularly interesting is trading that occurs through collusion with rogue government officials (27%), mostly prevalent in Taita Taveta (85%), Lamu (60%), Laikipia (58%) and Samburu (55%). This finding is supported by the analysis in table 8 which shows that corrupt and/or rogue government officials are perceived to be the most prevalent perpetrators of forest crimes in these four counties. The mention of corruption may also be indicative of existence of well-established criminal networks connecting individuals, small businesses, sawmillers, local and foreign companies in market for illicit forest products. However, overall, there is limited evidence to suggest the significant involvement of organized criminal groups in forest crimes. Only seven (7%) of respondents cited the involvement of organized criminal groups, notably in Taita Taveta (53%), Samburu (32%) and Tana River (38%).

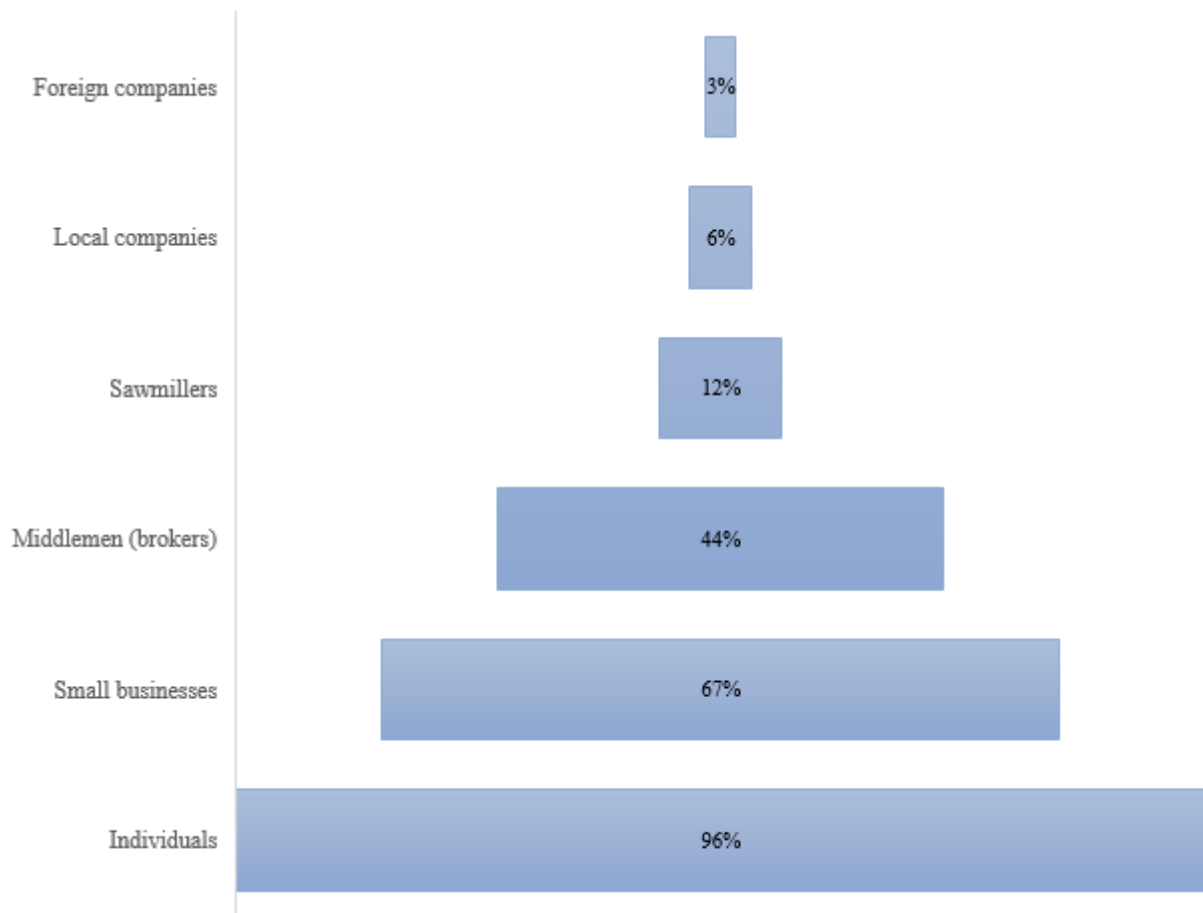
Table 8 Perpetrator categories of forest crimes

Driver	% of Total	County With Highest Prevalence
Individuals	98%	Kilifi, Lamu, Taita Taveta, Samburu, Tana River, Turkana, Narok, Laikipia, Nyeri, Elgeyo Marakwet, Bomet, Bungoma, Nandi
Small scale businesses	52%	Turkana
Corrupt and/or rogue government officials	40%	Taita Taveta, Lamu, Laikipia and Samburu (55%).
Local community groups(religious, cultural, social etc)	23%	Kakamega
Criminal groups	8%	Taita Taveta, Samburu
Local leaders (Chiefs, Village elders, Politicians etc)	7%	Lamu
Commercial companies	4%	Taita Taveta, Samburu
Foreign entities and companies	4%	Samburu
Land developers	3%	Laikipia

Source: Fieldwork data,2025

As shown in figure 5, in terms of the demand and supply dynamics of the market for illegal forest products, individuals (96%), small businesses (67%) and middlemen/brokers (44%) are the main buyers of illegal forest products. Im most cases supplied by individuals as indicated in table 8 showing that individuals are the foremost perpetrators (98%) of crimes and threats to forest ecosystems.

Fig. 5 Buyers Categories of Illegal Forest Products



Source: Fieldwork data, 2025

Social Network Analysis (SNA) of actors involved in the market for illegal forest products suggests that forest crimes are committed by a tightly-knit network, where small businesses, individuals, and middlemen (brokers) are the central players. These three actor categories have the highest co-occurrence as mentioned by respondents, indicating that they are consistently involved in buying and selling illegal forest products as shown in table 9.

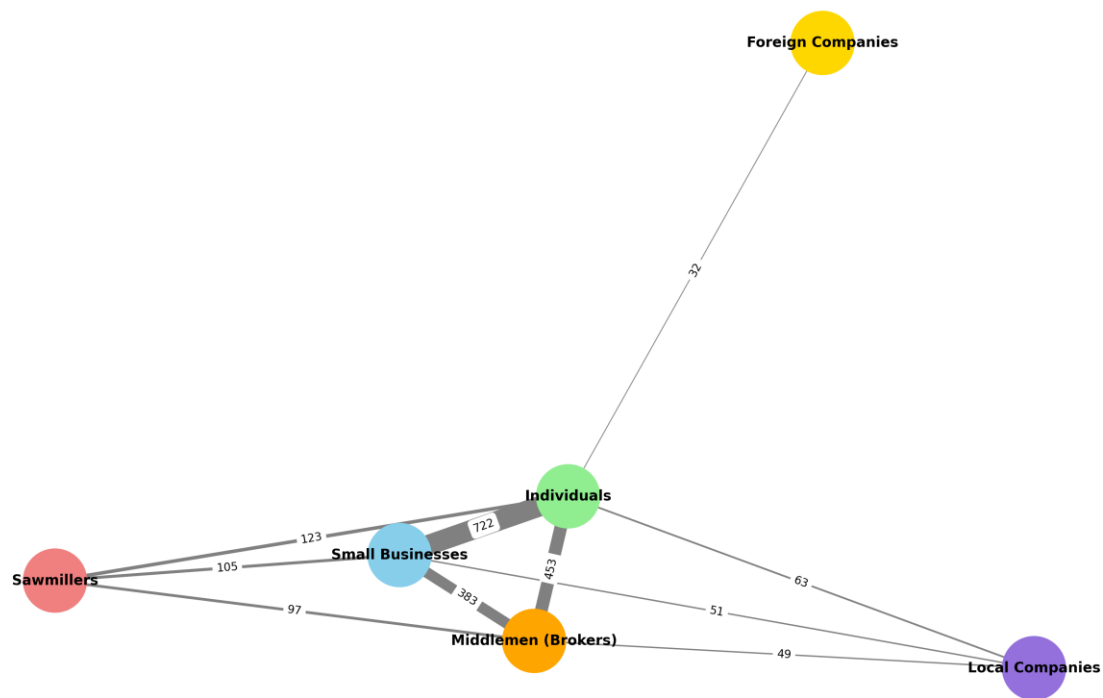
Table 9 Buyer Actor Connections By Strength of Relationship (edge list)

Actor 1	Actor 2	Relationship Strength (Frequency/Weight)
Small Businesses	Individuals	722
Middlemen (Brokers)	Individuals	453
Small Businesses	Middlemen (Brokers)	383
Sawmillers	Individuals	123
Sawmillers	Small Businesses	105
Sawmillers	Middlemen (Brokers)	97
Local Companies	Individuals	63
Small Businesses	Local Companies	51
Middlemen (Brokers)	Local Companies	49
Foreign Companies	Individuals	32

Source: Fieldwork data, 2025

The connection between small businesses and individuals (722) is the strongest, suggesting that small businesses are the primary actors generating demand for illegal forest products which are primarily supplied by individuals. Middlemen (brokers) play a crucial intermediary role as strong connectors between individuals (453), small businesses (383), sawmillers (97) and local companies (49). However the link between middlemen (brokers) and local companies is less pronounced indicating a lower volume of business involving illegal forest products. Even though local companies are weakly connected in the network, they are moderately linked with small businesses (51) and brokers (49). Sawmillers are moderately connected to individuals (123), small businesses (105) and brokers (97), indicating that they operate across multiple actors in the network, though with lower frequency. Foreign Companies have the weakest footprint in the network, only connecting weakly to individuals (32), suggesting limited or niche interaction, indicative of limited involvement in crimes and threats to forest ecosystems. However, it may also be that the involvement of foreign companies is only less visible and masked by indirect participation in the enterprise.

Fig. 6 Buyer Actor Network



Note: The thicker the line, the stronger the relationship (based on frequency of interaction).

Source: Fieldwork data, 2025

Consistent with the market relationship between small businesses and individuals, the strongest perpetrator connection is between individuals and small scale businesses (572), indicating frequent transactional co-involvement in crimes and threats to forest ecosystems.

Table 10 Perpetrator Actor Connections By Strength of Relationship (edge list)

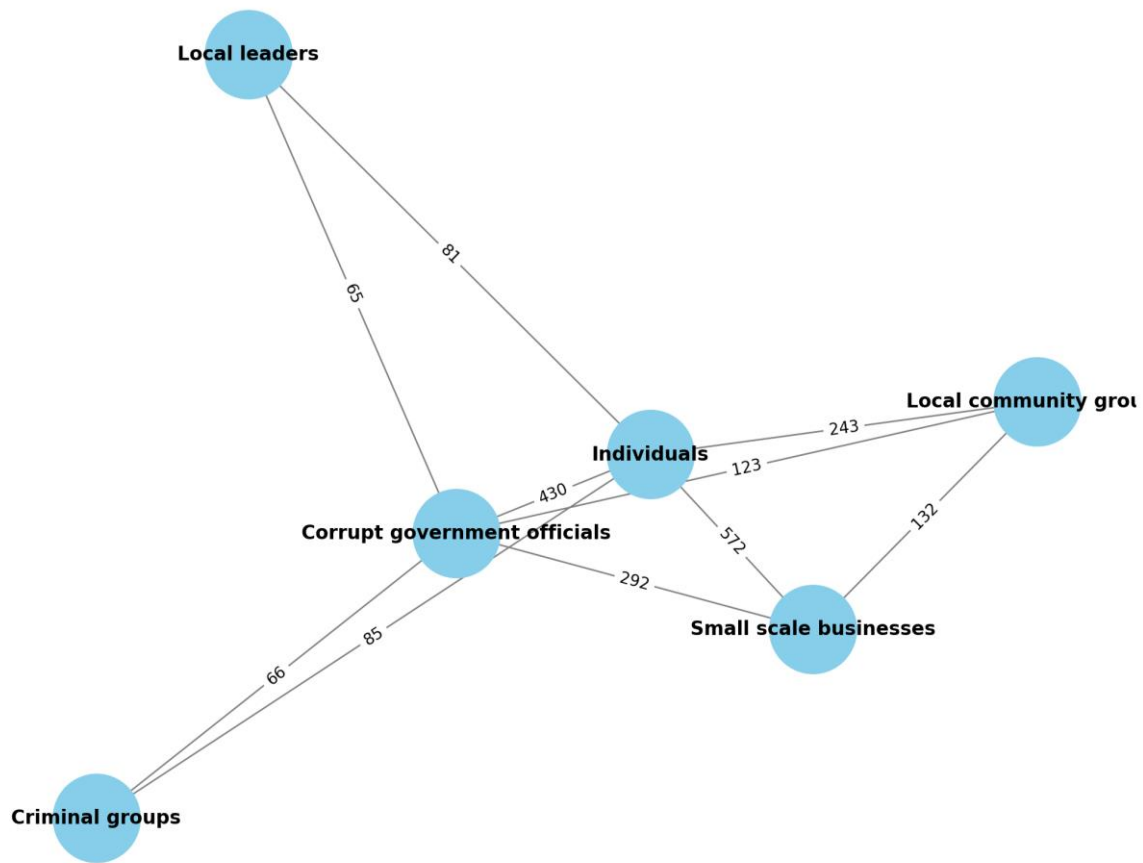
Actor 1	Actor 2	Relationship Strength (Frequency/Weight)
Individuals	Small scale businesses	572
Corrupt government officials	Individuals	430
Corrupt government officials	Small scale businesses	292
Individuals	Local community groups	243
Local community groups	Small scale businesses	132

Corrupt government officials	Local community groups	123
Criminal groups	Individuals	85
Individuals	Local leaders	81
Corrupt government officials	Criminal groups	66
Corrupt government officials	Local leaders	65

Source: *Fieldwork data, 2025*

Corrupt government officials are strongly connected to individuals (430) and small scale businesses (292), suggesting that both individuals and small scale businesses rely on corrupt government officials to switch off the state in order to perpetrate forest crimes unrestricted. The moderate connection between individuals and local community groups (243), suggests that individuals might engage with or be influenced by community groups to commit forest crimes. The weak connection between local community groups and small business (132), likely reflects collaborative efforts or community-oriented illegal forest activities that involve small scale businesses. Less significant but important is the weak connection between criminal groups and individuals (85), possibly indicating shared criminal interests. The key observation is that corrupt government officials are highly connected with several actors, indicating their central role in illegal forest networks responsible for crimes and threats to forest ecosystems in Kenya.

Fig 7 Perpetrator Actor Network



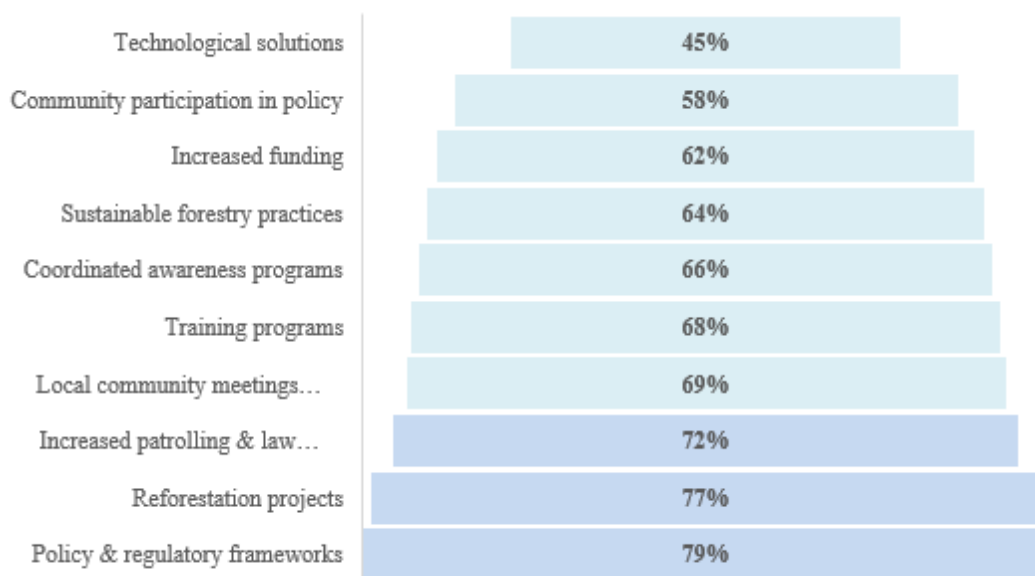
Source: Fieldwork data, 2025

Based on the Social Network Analysis (SNA) of buyers of forest products and perpetrators of forest crimes, it can be strongly concluded that individuals and small businesses are not only strongly connected in both networks, they are also connected to all other actors. This strongly shows the relative importance of individuals and small businesses in sustaining harmful practices to forest ecosystems in Kenya.

3.1.6. Responses to Forest Crimes and Threats to Forest Ecosystems

Most existing measures to address crimes and threats to forest ecosystem were considered effective (72%). Policy & regulatory frameworks (79%), Reforestation (77%) and law enforcement (72%) are perceived as the bedrock of the protection and conservation of forest ecosystems in Kenya. The fact that policy and regulatory frameworks are viewed as the most effective strategy in combating forest crimes underlines the importance of public policy in solving public problems. Technological solutions (45%) are considered least effective measures.

Fig. 8 Effectiveness of Forest Protection Measures



Source: Fieldwork data, 2025

It is surprising that even with the high penetration of internet technology in Kenya compared to other countries in Africa, respondents still viewed technology and internet based solutions as the least effective. Several factors could explain this situation. It could be that most communities living adjacent to forest ecosystems are yet to adequately experience the level of infrastructural development required to support penetration of technology e.g. internet and telephony bandwidth.

Another reason could be that even when technologies are deployed to purposes of community forest management, they tend to be deployed in packages that are often beyond individuals

capacity for use and are limited by poor internet coverage in remote regions and in some instance limited by privacy and social-cultural concerns, impeding the ability to develop real-time integrated forest monitoring systems (Loomis et al., 2024).

In terms of the most trusted government agency, The Kenya Forest Service – KFS (71%) is considered the most trusted and visible government actor. Local communities (71%) are the most trusted non state actors, indicating their relative importance in ground-level protection, through local entities such as Community Forest Associations (CFAs). Table 7 presents the comparative effectiveness of different stakeholders involved in the protection and management of forest ecosystems in Kenya as perceived by respondents.

Table 11 Comparative Effectiveness of Forest Protection by Stakeholder Type.

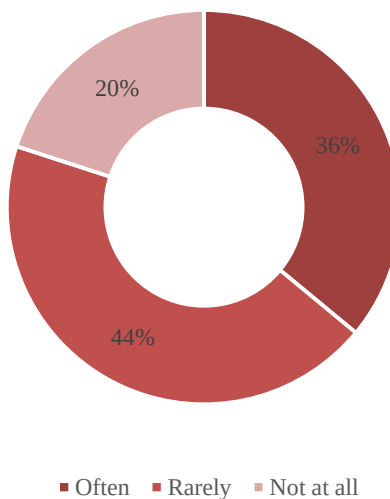
Stakeholder Type	Effectiveness	Key Insight
Kenya Forest Service (KFS)	 71%	High: Most trusted and visible government actor
Local Communities	 71%	High: Ground-level surveillance and deterrence
Kenya Wildlife Service (KWS)	 69%	High: Effective in forest-wildlife overlap zones
National Govt. Admin Officers	 67%	High: Enforcement authority and proximity to local communities
International Organizations	 59%	Moderate – High: Small reach but big impact through funding, research and policy
KEFRI, NEMA, WRA	 35–57%	Moderate – High: Technical but limited enforcement visibility
National Police, County Enforcement	 27%	Low: Low legitimacy and/or lack of resources
Forest Products Businesses	 21%	Very low: Seen as more complicit than helpful

Source: Fieldwork data, 2025

3.1.7. Challenges Affecting Responses to Crimes and Threats to Forest Ecosystems

The most prominent challenge affecting measures for addressing crimes and threats to forest ecosystems mentioned by the study respondents is non reporting and underreporting of incidents. Only 36% of respondents indicated that prohibited forest activities are often reported. A slightly higher proportion (44%) indicated that crimes and threats are rarely reported and another 20% suggested that most incidents go unreported.

Fig. 9 Likelihood of Reporting Forest Crimes



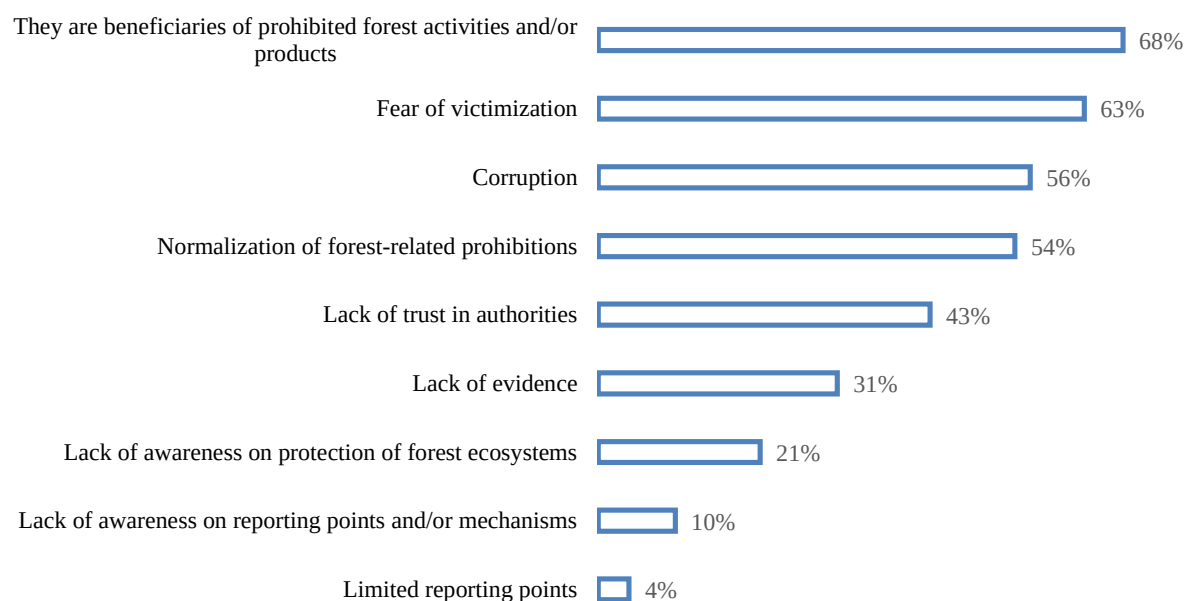
Source: Fieldwork data,2025

This problem appears to affect Turkana county the most where only 3% of respondents indicated that crimes are likely to be reported and a significant 59% suggested that crimes are likely not to be reported at all.

Several factors may influence reporting rates including but not limited to the size of forest cover and population density. Forest ecosystems encompassing large forests and densely populated locations are expected to be characterised by higher forest crimes rates that go unnoticed or unreported. In addition, local traditions, norms and value systems significantly shape local,

belief, traditions and perceptions, which in turn shape local definitions of criminal or deviant forest activities. Thus, depending on prevailing value and normative systems, local communities are likely to view forest as part of their common resource for which they have a right to extract and benefit from (68%) without sanctions. Even if such extraction equates to criminal activity as prescribed by law. Literacy rates and level of individual and community awareness about environmental issues such as climate change and forest protection also significantly affect the probability that crimes and threats to forest ecosystems will be reported. Systemic reasons for underreporting of forest crimes include: corruption, limited safe reporting mechanism, fear of victimisation and lack of trust in authorities as presented in figure 14 below.

Fig. 10 Reasons Forest Crimes Go Unreported



Source: *Fieldwork, data, 2025*

The following were mentioned as challenges affecting response to forest crimes in the county: inadequate financial, human, and infrastructural resources (64%), corruption (60%) and inadequate community participation (50%) also significantly affect measures for protecting forest ecosystems against human induced threats and crimes. Importantly, corresponding with the view that use of technological solutions (45%) is the least effective protective measure, lack

of or poor use of technology (9%) is perceived as the least significant challenge affecting measures for protecting forest ecosystems. In a world that social economic developments are rapidly getting influenced by new technologies such as artificial intelligence (AI), robotics, social media and remote data analytics etc., this finding is important since it highlights the deep rooted attitudes among communities and responsible agencies on the application and use of modern technology in the management of national forest resources as highlighted in table 12 below.

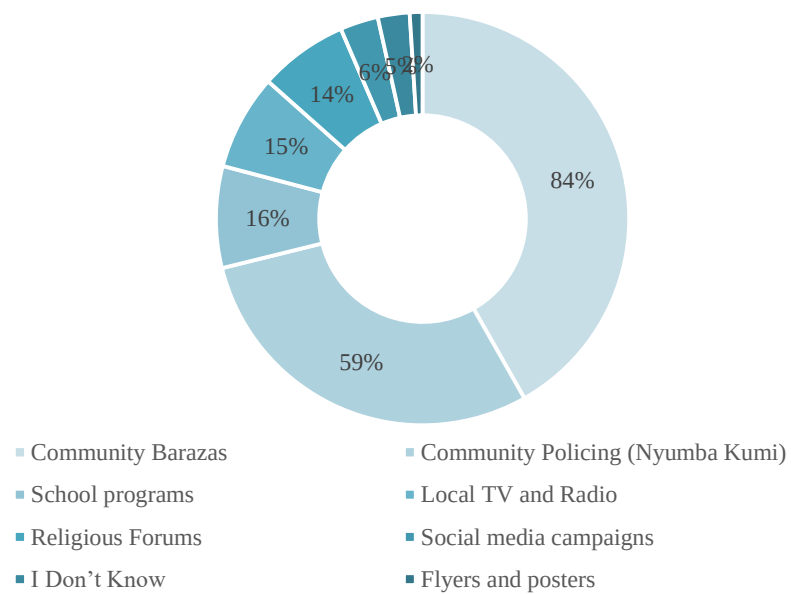
Table 12 Challenges Affecting Responses to Forest Crimes

Challenge	% Mention
Inadequate financial, human and infrastructural resources	64%
Corruption	60%
Inadequate community participation in the protection of forest ecosystems	50%
Laxity among responsible forest ecosystem protection duty bearers	49%
Gaps in policies and government directives related to forest ecosystems	36%
Lack of awareness on protection of forest ecosystems	29%
Inadequate involvement of local leadership in the protection of forest ecosystems	23%
Lack of political goodwill	20%
Lack of and use of technology	9%
Complex legal frameworks	6%

Source: Fieldwork, data,2025

However, Community Barazas (84%) and Community Policing & Nyumba Kumi (59%) are perceived as the most effective platforms for creating awareness on environmental protection and sustainable legal use of forest resources. Social media campaigns (6%) and the use of flyers/posters (2%) are seen as least effective.

Fig. 11 Preferred Medium of Awareness on Forest Crimes



Source: Fieldwork, data, 2025

CHAPTER FOUR: SUMMARY OF FINDINGS AND RECOMMENDATIONS

4.1. Introduction

The general objective of this study was to explore the nature, actors, and drivers of environmental crimes and threats to forest ecosystem in Kenya. The specific objectives of the study were to investigate the drivers of forest offences; analyse the network of actors and flow processes in forest offences chain; examine responses to forest crimes and threats to forest ecosystems and identify challenges affecting responses to forest crimes and threats to forest ecosystems.

4.2. Summary of Major Findings

4.2.1. Drivers of Forest Offences

Poverty and lack of livelihoods are the top drivers of forest crimes. However, attention should be paid to the construction industry and ready markets provided by small businesses which also appears to significantly drive forest crimes. Indigenous tree species and medicinal plant species are the most threatened flora, pointing to both cultural and commercial exploitation.

4.2.2. Actors and flow processes in forest offences chain

A small portion of forest crimes appear, though not explicitly, to intersect with organised illegal activities. Generally, illegal forest activities happen both day and night; some regions have more night-time activity indicative of strategies designed to evade law enforcement which appears to be more rigorous in such regions. Prohibited forest products are mostly traded in raw form, often directly to customers but with significant broker involvement in some counties. Transport of forest products is predominantly by foot and motorcycles. Corruption and collusion with rogue officials are reported to facilitate illegal trade in some areas. Though the presence of organized criminal groups is generally limited, it is noted in some counties, such as Taita Taveta, Samburu, and Tana River. Forest crimes are committed by a tightly-knit network of individuals, small businesses, corrupt government officials, local community groups, criminal groups and local leaders. Individuals, small businesses, corrupt government officials are the core enablers or

beneficiaries of forest crimes and are consistently involved in extracting, buying and selling of illegal forest products. In the entire criminal network of forest crimes, individuals are the most powerful/influential actors in the network, playing a central role in linking to all other actors.

4.2.3. Responses to Forest Crimes and Threats to Forest Ecosystems

Policy & regulatory frameworks; reforestation and law enforcement are perceived to be the most effective measures for the protection and conservation of forest ecosystems in Kenya. This underlines the relative importance of public policies, particularly environmental policies in management of forest ecosystems in Kenya. Technological oriented solutions are considered least effective measures, signaling the low uptake among communities in integrating technology in community resource management practices. The Kenya Forest Service is considered to be the most trusted and visible government actor in the protection of forest ecosystems in Kenya. .

4.2.4. Challenges Affecting Responses to Forest Crimes and Threats to Forest Ecosystems

Non reporting and underreporting of forest crimes is the most significant challenge affecting the protection of forest ecosystems in Kenya. Other important challenges include inadequate financial, human, and infrastructural resources, corruption and inadequate community participation.

4.3. Conclusions

Communities and individuals living adjacent to forest ecosystems and highly aware of the crimes that threaten forest ecosystems. However, this knowledge notwithstanding, high levels of poverty and lack of alternative livelihoods drive them to towards activities that threaten forest ecosystems. Given that the Kenya Forest Service is seen as the most credible government agency for the protection of forests in the country, there is a sufficient goodwill which presents an opportunity for KFS to strengthen partnerships with local communities in enhancing the protection and effective management of forests.

4.4. Key Policy Recommendations

- (a) **The ministry of environment and natural resources through KFS, Local Govenments, National Government Administrative Offices and Sector Non Governmental Agencies e.g. UNEP should promote alternative income sources:** This may include integrating trees planting with crops in selected forest blocks and areas that support biodiversity and sustainable agriculture. It also includes controlled and systematic harvesting of products like timber, honey, mushrooms, medicinal plants, etc. in certain forest ecosystems e.g. along the coastal belt, controlled crafts & cottage industries can be developed to promote bamboo products, woven goods for local and international markets.
- (b) **The Kenya Forest Service, Kenya Wildlife Services should strengthen forest governance and law enforcement** through regular day and nighttime patrols and monitoring. For effectiveness and sustainability, this should incorporate a well coordinated and funded volunteer program that enlists **volunteer community forest scouts** and the application of technology e.g. drones. This would especially reduce daytime forest crimes. Internal **KFS** Anti-corruption measures should be strengthened by establishing transparent accountability systems and collaborating with the **Ethics Anti-Corruption Commission (EACC)**.

- (c) Anti-Corruption mechanisms would also have a multiplier effect in **improving the reporting rate for forest crimes**. This should be in addition to establishing or strengthening an anonymous forest crimes reporting and reward systems for informants by **KFS**
- (d) **To enhance community wareness on the importance of forest ecosystems**, **KFS, NGAO, Ministry of Education (MoE) and County governments**, should design and implement sustainable targeted forest education campaigns that integrate **community barazas, nyumba kumi and community forest associations (CFA)**. Such campaigns can also be integrated in the **competency based curriculums (CBC) for learners** at the earlier stage of education as a way of mainstreaming the protection of forest ecosystems within the formal learning environment. Creating awareness on the benefits of forest protection should be accompanied by measure that reduce dependency on illegal forest activities by expanding opportunities for sutatinable alternative livelihood.
- (e) **Improving Data Collection, Sharing and Research** will greatly bridge the gap in available data and information on forest crimes. This includes enhancing research budgets and collaboration for Universities, **KEFRI, NCRC, KFS for properly designed interdisciplinary reserch project/programs on forest ecosystems**. Good and available data will definitely yield more effective evidence based policies and practices to aid the forest protection sub sector and criminal justice responses to forest crimes.
- (f) **To disrupt criminal networks**, concerned criminal justicice agancies **Kenya Forest Service, Ministrry of Interior and Coordination of National Government through the National Police Service, Kenya Probation Service and Kenya Prison Service, and Judiciary** should design multisectoral Criminal justice policies and interventions that target individuals. This is because, the analysis in this study has shown that individuals are the most significant acrors in the network of criminal actors targeting forest ecosystems.
- (g) **There is need for Parliament Kenya and the Ministry of Enviroment and Natural Resources through KFS to re-evaluate existing legal frameworks for protecting forests** with the view of improving law enforcement. Strengthening of the legal and regulatory framework should be done in ways that weaken the dubious link between individuals, small businesses and corrupt government officials while expanding avenues

for communities to co-exist and sustainably use forest resources for generation of livelihoods. This would strengthen the deterrence capacity of existing and new legislation while offering incentives for communities and individuals to avoid forest crimes in favour for protection.

- (h) Local leaders (**NGAO, Political Class etc.**) and criminal groups appear to be intricately connected in ways that afford political protection for criminal groups involved in prohibited forest practices. Addressing this problem requires both a political approach where political actors commit to accountability for the protection of forest ecosystems and a criminal justice approach where concerned agencies (**NPS and KFS**) investigate and prosecute political protection and criminal collusion in forest crimes.

REFERENCES

- Abdi, Y. M. (2013). The impact of population increase on forest conservation in Wajir County North Eastern Province Kenya.
- Ajwang, N. W. O. (2023). Effects of human activities on the Nile Basin: lessons from Kenya. *Open Journal of Social Sciences*, 11(1), 23-31.
- Clarke, R. V. (1980). Situational crime prevention: Theory and practice. *Brit. J. Criminology*, 20, 136.
- Clarke, R. V. (1995). Situational crime prevention. *Crime and Justice*, 19, 91-150.
- Costa, J. (2020). Social network analysis in the fight against illegal wildlife trade. Building a bridge between research and practice.
- Dewi, I., Abdullah, L., Zeldi, L., Andara, D., Ramadhan, F., & Lembang, H. (2019). The role of forestry police in the prevention and eradication of forest destruction. IOP Conference Series: Earth and Environmental Science,
- ENACT. (2023). *Africa Organised Crime Index 2023: Increasing criminality, growing vulnerabilities*.
- Eregae, J. E., Njogu, P., Karanja, R., & Gichua, M. (2023). Economic assessment of selected regulatory ecosystem services (RES) in the Elgeyo and Nyambene Watersheds Ecosystems in Kenya. *Open Journal of Forestry*, 13(2), 200-224.
- Filardi, M. J. (2020). *Evaluating Conservation Approaches in Preventing Forest Crime: The Cases of Arabuko Sokoke Forest and Kakamega Forest, Kenya* United States International University-Africa].
- Gakuya, D. W., Okumu, M. O., Kiama, S. G., Mbaria, J. M., Gathumbi, P. K., Mathiu, P. M., & Nguta, J. M. (2020). Traditional medicine in Kenya: Past and current status, challenges, and the way forward. *Scientific African*, 8, e00360.
- Gluszek, S., Drury, R., Lemieux, A., Slade, J., & Viollaz, J. (2022). Launch of situational crime prevention toolkit to address illegal wildlife trade. *Oryx*, 56(1), 9-9.
- Imarhiagbe, O., Onyeukwu, I., Egboduku, W., Mukah, F., & Ogwu, M. (2022). Forest Conservation Strategies in Africa: Historical Perspective, Status and Sustainable Avenues for Progress. In *Biodiversity in Africa: potentials, threats and conservation* (pp. 547-572). Springer.
- Imo, M., & Imo, M. (2012). Forest degradation in Kenya: Impacts of social, economic and political transitions. *African Political, Economic and Security Issues*, 1st ed.; Adoyo, JW, Wangai, CI, Eds, 1-38.
- Israel, M., Hay, I., Gadd, D., & Karstedt, S. (2011). Research ethics in criminology. *The SAGE handbook of criminological research methods*. London: Sage, 500-514.
- Kamenderi, M., & Muteti, J. (2019). Status of drugs and substance abuse among the general population in Kenya. *African Journal of Alcohol and Drug Abuse (AJADA)*, 54-59.
- Kinyili, B. M. (2022). Potential of agroforestry in sustainable fuelwood supply in Kenya. *J. Energy Nat. Resour*, 11, 1-6.
- Kioko, E. M. (2022). Forest Crime in Africa: Actors, Markets and Complexities. In *African Futures* (pp. 125-140). Brill.

- Kioko, E. M., & Kinyanjui, M. M. (2023). Commodifying East Africa's Sandalwood: Organised crime and community participation in transnational smuggling of endangered species. *CONSERVATION, MARKETS, AND THE ENVIRONMENT IN SOUTHERN AND EASTERN AFRICA*, 223.
- Kiruki, H. M., Van Der Zanden, E. H., Kariuki, P., & Verburg, P. H. (2020). The contribution of charcoal production to rural livelihoods in a semi-arid area in Kenya. *Environment, Development and Sustainability*, 22, 6931-6960.
- KNBS. (2019). *Kenya Population and Housing Census*.
- Kuto, K. E. (2020). *Monitoring Tree Cover Changes in Kenya's Five Major Water Towers using Geospatial Technologies* [University of Nairobi].
- Langat, D., Cheboiwo, J., Okoth, S., Kiprop, J., Kisiwa, A., Guzha, A., Smith, N., DeMeo, T., Gatama, S., & Kerkering, J. (2021). The value of forest ecosystem services of Mau complex, Cherangany and Mt. Elgon, Kenya.
- Lavorgna, A., Rutherford, C., Vaglica, V., Smith, M. J., & Sajeve, M. (2018). CITES, wild plants, and opportunities for crime. *European Journal on Criminal Policy and Research*, 24, 269-288.
- Lippe, R. S., Cui, S., & Schweinle, J. (2021). Estimating global forest-based employment. *Forests*, 12(09), 1219.
- Loomis, J. J., e Souza, F. d. A., Angel, M., & Fabbri, A. (2024). Technology-enhanced community forest management in tropical regions: A state of the art. *Journal of Environmental Management*, 350, 119651.
- Macharia, J. K., Raina, S. K., & Muli, M. (2007). Stingless beekeeping: an incentive for rain forest conservation in Kenya. Ecosystem based management: beyond boundaries. Proceedings of the Sixth International Conference of Science and the Management of Protected Areas,
- Maina, P. M. (2021). *Analysis of Household Socio-Economic Drivers of Cattle Grazing and Grass Harvesting in Mount Kenya West Protected Forest, Kenya* [St. Paul's University].
- Marin, A., & Wellman, B. (2011). Social network analysis: An introduction. *The SAGE handbook of social network analysis*, 11-25.
- Mbuni, Y. M., Wang, S., Mwangi, B. N., Mbari, N. J., Musili, P. M., Walter, N. O., Hu, G., Zhou, Y., & Wang, Q. (2020). Medicinal plants and their traditional uses in local communities around Cherangani Hills, Western Kenya. *Plants*, 9(3), 331.
- Muhati, G. L. (2022). Ecosystem services of Hurri hills, a montane woodland ecosystem in the arid lands of northern Kenya. *Global Ecology and Conservation*, 33, e01951.
- Muthike, G. M., & Githiomi, J. K. (2020). Value chain analysis of farm grown *Melia volkensii* (Gurke) timber in the South Eastern Dry lands of Kenya.
- Mwambeo, H. M., Wambugu, L. N., & Nyonje, R. O. (2020). Influence of knowledge and skills empowerment on sustainability of forest conservation projects in Kenya. *Journal of Education Research and Rural Community Development*, 2(2), 19-37.
- Mwangi, N., Waithaka, H., Mundia, C., Kinyanjui, M., & Mutua, F. (2020). Assessment of drivers of forest changes using multi-temporal analysis and boosted regression trees model: a case study of Nyeri County, Central Region of Kenya. *Modeling Earth Systems and Environment*, 6, 1657-1670.
- NACADA. (2022). *National Survey on the Status of Drugs and Substance Use in Kenya*

- Namaswa, T., Githiomi, J., Oduor, N., & Kitheka, E. (2022). Sustainable biomass energy production and utilization in sub-Saharan Africa: A case study of Kenya. *Journal of Horticulture and Forestry*, 14(4), 56-67.
- Ndegwa, G., Sola, P., Iiyama, M., Okeyo, I., Njenga, M., Siko, I., & Muriuki, J. (2020). *Charcoal value chains in Kenya: a 20-year synthesis*.
- Nduguta, R. N., Kung'u, J. B., & Kinyanjui, M. (2024). Distribution of Illegal Activities and Tree Species Poaching in Aberdare Ranges, Kenya. *International Journal of Scholarly Practice*, 4(2), 11-27.
- Ngome Chisika, S., & Yeom, C. (2020). The key factors affecting tree producer associations involved in private commercial forestry in Kenya. *Sustainability*, 12(10), 4013.
- Ojunga, S., Langat, D., Owange, K., Otuoma, J., Ayaga, G., Muskiton, K., Wanyiri, M., & Isack, M. (2023). Medicinal plants and their economic value in Kakamega Forest Ecosystem: A case study of sustainable land/forest project in Western Kenya. *Journal of Medicinal Herbs and Ethnomedicine*, 9, 18-25.
- Okumu, W. (2022). Sandalwood trafficking in Kenya.
- Oliveira, M., & Gama, J. (2012). An overview of social network analysis. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery*, 2(2), 99-115.
- Ototo, G., & Vlosky, R. P. (2018). Overview of the forest sector in Kenya. *Forest Products Journal*, 68(1), 6-14.
- Reppin, S., Kuyah, S., de Neergaard, A., Oelofse, M., & Rosenstock, T. S. (2020). Contribution of agroforestry to climate change mitigation and livelihoods in Western Kenya. *Agroforestry Systems*, 94, 203-220.
- Riungu, P. M., Nyaga, J. M., Githaiga, M. N., & Kairo, J. G. (2022). Value chain and sustainability of mangrove wood harvesting in Lamu, Kenya. *Trees, Forests and People*, 9, 100322.
- Rotich, B., Kindu, M., Kipkulei, H., Kibet, S., & Ojwang, D. (2022). Impact of land use/land cover changes on ecosystem service values in the cherangany hills water tower, Kenya. *Environmental Challenges*, 8, 100576.
- Rouillé-Kielo, G. (2021). Natural Resources Management in Kenya (Water and Forest). *Kenya in Motion 2000-2020*, 223.
- Scott, D. (2018). The politics and ethics of criminological research. *Doing criminological research*, 137-157.
- Service, K. F. (2021). *National Forest Resources Assessment Report 2021, Kenya*. K. F. Service. <https://www.kenyaforestservice.org/>
- Service, K. F. (2023). Kenya Forest Service Strategic Plan 2023-2027.
- Tabassum, S., Pereira, F. S., Fernandes, S., & Gama, J. (2018). Social network analysis: An overview. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery*, 8(5), e1256.
- Tarus, G. K., & Nadir, S. W. (2020). Effect of forest management types on soil carbon stocks in montane forests: a case study of eastern mau forest in Kenya. *International Journal of Forestry Research*, 2020(1), 8862813.
- Tebkew, M., & Atinkut, H. B. (2022). Impact of forest decentralization on sustainable forest management and livelihoods in East Africa. *Trees, Forests and People*, 10, 100346.

- UNODC. (2024). *Illegal Exploitation of Wild Flora* [Teaching Module]. Sharing Electronic Resources and Laws on Crime. <https://sherloc.unodc.org/cld/en/education/tertiary/wildlife-crime/module-4/index.html>
- Vohryzek-Bolden, M. (1997). Ethical Dilemmas Confronting Criminological Researchers. *Journal of Crime and Justice*, 20(2), 121-138.
- Wanjiru, K. R. (2022). Corporate Governance Practices and Performance of Kenya Forest Service in Nairobi City County.
- Wanyanga, L. T. (2021). *Conservation and Management of Forests in Kenya: an Analysis of the Regulatory Framework Regulating Timber Harvesting in Natural and Plantation Forests in Kenya* University of Nairobi].
- Wasserman, S. (1994). Social network analysis: Methods and applications. *The Press Syndicate of the University of Cambridge*.



Appendix A: Community Survey Questionnaire

ENVIROMENTAL CRIMES AND THREATS TO FOREST ECOSYSTEM IN KENYA

County: _____

Sub-County: _____

Division: _____

Location: _____

Date of interview: _____

Start time: _____ End Time: _____

Name of the Researcher: _____

Introduction

The National Crime Research Centre (NCRC) is a State Corporation under Ministry of Interior and National Administration established by the National Crime Research Centre Act, 1997. The Centre is conducting a study on “Environmental Crimes and Threats to Forest Ecosystem in Kenya”. You are, therefore, requested to participate in the exercise by providing relevant information on the subject. Your participation is critical in making this study a success and helping the Government to address the challenge of forest crimes in Kenya. All information shared will be treated with utmost confidentiality and will be used for research purposes only.

Thank you.

Tick appropriately

- | | |
|--|--------|
| 1. Respondent agrees to be interviewed | [] |
| 2. Respondent does not agree to be interviewed | [] |

Section A: Respondent's Background Information

- | | |
|--|--------|
| 1. Sex | |
| 1. Male | [] |
| 2. Female | [] |
| 2. Age category of the respondent | |
| 1. 18-34 | [] |
| 2. 35-51 | [] |
| 3. 52+ | [] |
| 3. Marital status | |
| 1. Single/Never Married | [] |
| 2. Married | [] |
| 3. Separated | [] |
| 4. Divorced | [] |
| 5. Widowed | [] |
| 4. Highest level of education attained | |
| 1. None | [] |
| 2. Primary | [] |
| 3. Secondary | [] |
| 4. Middle-level college | [] |
| 5. University | [] |
| 6. Adult literacy | [] |
| 7. Other (Specify_____) | |
| 5. Main occupation | |

1. Permanent employment – Private Sector []
2. Permanent employment – Public Sector []
3. Casual/temporary employment- Private Sector []
4. Casual/temporary employment- Public Sector []
5. Businessperson []
6. Subsistence farming []
7. Other (specify_____)

Section B: Patterns of Forest Crimes and Threats to Forest Ecosystems

6. What forest-related activities take place in this locality (list).
 1. Farming
 2. logging
 3. Grazing
 4. Collecting the soil
 5. Collecting firewood
 6. Looking for medicinal barks
 7. Planting trees with help of NGO and KFS.(Shamba System/ reforestation projects)
 8. Charcoal burning
 9. Trespassing
 10. Leisure Hiking
 11. Religious activities
 12. Bee keeping
 13. Other (specify_____)

7. Based on your knowledge and/or experience, what are the common prohibited forest activities in this area? (multiple choice)
 1. Arson []
 2. Logging []
 3. Mining (stones, minerals) []
 4. Land grabbing []
 5. Forest conversion (farming) []

- | | |
|--|-------|
| 6. Littering and pollution | [] |
| 7. Extraction for medicinal and aesthetics use | [] |
| 8. Extraction for domestic energy use | [] |
| 9. Extraction for food and nutritional use | [] |
| 10. Extraction for cultural use | [] |
| 11. Trespassing into forests | [] |
| 12. Grazing | [] |
| 13. Soil harvesting (Sand and Murram) | [] |
| 14. Extraction of grass | [] |
| 15. Disposal of dead bodies | |
| 16. Other (Specify_____) | |

8. Based on your knowledge and/or experience, what other criminal activities are closely associated with prohibited forests activities in this area?

- | | |
|--|-------|
| 1. Corruption | [] |
| 2. Smuggling of contrabands | [] |
| 3. Drug trafficking | [] |
| 4. Human trafficking | [] |
| 5. Pouching and wildlife trafficking | [] |
| 6. Armed robbery | |
| 7. Trafficking of weapons | [] |
| 8. Banditry and cattle rustling | [] |
| 9. Money laundering | [] |
| 10. Tax evasion | [] |
| 11. Gang violence | [] |
| 12. Forgery of documents | [] |
| 13. Illegal cultural and/or religious activities | [] |
| 14. Other (Specify_____) | |

9. Based on your knowledge and/or experience, which forest species are most targeted (multiple choice)?

- | | |
|--|-------|
| 1. Rosewood | [] |
| 2. Sandalwood | [] |
| 3. Red Cedar (Juniperus procera) | [] |
| 4. Eucalyptus | [] |
| 5. Cypress | [] |
| 6. Pine | [] |
| 7. Indigenous Species (please specify) | [] |
| 8. shrubs for herbal medicine | [] |
| 9. mangrove (MIKOKO) | [] |
| 10. Bamboo (MIANZI) | [] |
| 11. Other (Specify_____) | |

10. From your experience are there some prohibited forest species from your area which are traded across national borders(other countries)?

1. Yes
2. No
3. Don't know

11. If yes in 10, which are these forest species?

- | | |
|--|-------|
| 1. Rosewood | [] |
| 2. Sandalwood | [] |
| 3. Red Cedar (Juniperus procera) | [] |
| 4. Eucalyptus | [] |
| 5. Cypress | [] |
| 6. Pine | [] |
| 7. Indigenous Species (please specify) | [] |
| 8. shrubs, herbs, climbers and grasses | [] |
| 9. Mangrove | [] |
| 10. Bamboo | [] |
| 11. Other (Specify_____) | |

12. How often do prohibited forest activities take place or occur in this area?

- | | |
|----------------------------|--------|
| 1. Daily | [] |
| 2. Weekly | [] |
| 3. Monthly | [] |
| 4. Yearly | [] |
| 5. Rarely | [] |
| 6. Periodically/Seasonally | [] |
| 7. Don't Know | [] |

Section C: Drivers of Forest Crimes and Threats to Forest Ecosystems

13. In your view, what contributes or drives involvement in prohibited forest activities in this area (multiple choice)?

- | | |
|---|--------|
| 1. Poverty and lack of alternative livelihoods | [] |
| 2. Greed for money and wealth | [] |
| 3. Need for herbal medicine | [] |
| 4. Lack of adequate land for farming | [] |
| 5. Demand for cultural products and artifacts | [] |
| 6. Need for food and nutritional value | [] |
| 7. Lack of designated waste disposal sites | [] |
| 8. Demand for construction materials | [] |
| 9. Corruption | [] |
| 10. Weak law enforcement and protection of forests | [] |
| 11. Ready markets for forest products | [] |
| 12. Inadequate community awareness on importance of forest conservation | [] |
| 13. Other (Specify_____) | |

Section D: Actors and Flow Processes in Forest Offences Chain

14. Based on your knowledge and/or experience, what times do most prohibited forest activities take place in this area? (select one option)?

1. Day-time []
 2. Night-time []
 3. Both day and night time []
 4. I don't know []
15. In which form are prohibited forest products from this area typically traded and/or moved (multiple choice)?
1. Raw (e.g. logs) []
 2. Semi-processed (wood, ply) []
 3. I don't know []
16. Based on your knowledge and/or experience, how are prohibited forest products sold/traded in this area (multiple choice)?
1. Directly to customers []
 2. Through middle men (brokers) []
 3. Through organized groups and networks []
 4. Through collusion with rogue government officials []
17. Who-mostly obtains/buys prohibited forest products from in this area (multiple choice)?
1. Sawmillers []
 2. Small businesses []
 3. Middlemen (brokers) []
 4. Local companies []
 5. Foreign companies []
 6. Individuals
 7. Other (Specify_____)
18. Based on your knowledge and/or experience, what mode of transport is commonly used to transport prohibited forest products in this area (multiple choice)?
1. Foot (porter) []
 2. Animals []
 3. Bicycles []

- | | |
|--|-------|
| 4. Motorcycle | [] |
| 5. Tuk tuks | [] |
| 6. Small cars | [] |
| 7. Pick-ups | [] |
| 8. Tractors | [] |
| 9. Lorries | [] |
| 10. Water transport vessels (Boats and/or rafts) | [] |
| 11. Air transport vessels | [] |
| 12. Other (Specify_____) | |

19. Please provide the transit routes for prohibited forest products in this area?

20. (a) Based on your knowledge and/or experience, are there criminal groups involved in prohibited forest activities in this area?

- | | |
|--------------------------|-------|
| 1. Yes | [] |
| 2. No (If No go to Q21.) | [] |
| 3. I don't know | |

(b) If YES, name the criminal groups

21. Based on your knowledge and/or experience, who are the perpetrators of prohibited forest activities in this area (multiple choice)?

- | | |
|---|-------|
| 1. Individuals | [] |
| 2. Criminal groups | [] |
| 3. Local community groups (Religious Culture social etc.) | [] |
| 4. Corrupt and/or rogue government officials | [] |
| 5. Small scale businesses | [] |
| 6. Commercial companies | [] |
| 7. Local leaders (Chiefs, Village elders, Politicians etc.) | [] |
| 8. Foreign entities and companies | [] |
| 9. Land developers | [] |
| 10. Other (Specify_____) | |

Section E: Responses to forest crimes and threats to forest ecosystems

22. What measures are currently in place to address prohibited forest activities in this area and how effective are they? (Multiple choice)

1. Increased patrolling, surveillance and law enforcement (including strict fines and penalties) []
1.) Effective 2.) Not Effective; 3 Not Sure.
2. Increased local community meetings (Barazas) []
1.) Effective 2.) Not Effective; 3 Not Sure.
3. Increased participation of local communities in decision-making, legislation and policy formulation on forests conservation []
1.) Effective 2.) Not Effective 3.) Not Sure.
4. Coordinated awareness programs []
1.) Effective 2.) Not Effective 3.) Not Sure.
5. Policy and regulatory frameworks []
1.) Effective 2.) Not Effective 3.) Not Sure.
6. Increased funding for forest protection and conservation []
1.) Effective 2.) Not Effective 3.) Not Sure.
7. Reforestation projects []
1) Effective 2) Not Effective 3) Not Sure
8. Sustainable forestry and land use practices []
1) Effective 2) Not Effective 3) Not Sure
9. Technological solutions []
1) Effective 2) Not Effective 3) Not Sure
10. Training programs on forest management []
1) Effective 2) Not Effective 3) Not Sure
11. Other (Specify_____)

1) Effective 2) Not Effective 3) Not Sure

23. Which stakeholders are addressing prohibited forest activities and protecting forests in this area and how effective they are (multiple choice)?

1. Forest products Dealers/Businesses (including companies) []

1) Effective 2) Not Effective 3) Not Sure

2. Government agencies (Specify) []

a) Kenya Forest Service

1) Effective 2) Not Effective 3) Not Sure

b) Kenya Forest Research Institute []

1) Effective 2) Not Effective 3) Not Sure

c) Kenya Wildlife Service []

1) Effective 2) Not Effective 3) Not Sure

d) Kenya Revenue Authority []

1) Effective 2) Not Effective 3) Not Sure

e) National Police Service []

1) Effective 2) Not Effective 3) Not Sure

f) County By-Laws Enforcement Department []

1) Effective 2) Not Effective 3) Not Sure

g) Kenya Ports Authority []

1) Effective 2) Not Effective 3) Not Sure

h) Kenya Coast Guard Services []

1) Effective 2) Not Effective 3) Not Sure

i) National Environmental Management Authority

1) Effective 2) Not Effective 3) Not Sure

j) Water Resources Authority

1) Effective 2) Not Effective 3) Not Sure

k) National Government Administrative Officers (that is, County Commissioners and line officers) []

1) Effective 2) Not Effective 3) Not Sure

- 1) Immigration Department []
1) Effective 2) Not Effective 3) Not Sure
3. Local community members []
1) Effective 2) Not Effective 3) Not Sure
4. International organizations []
1) Effective 2) Not Effective 3) Not Sure
5. Civil Society Organizations (Non-Governmental Organizations, Community-Based Organizations and Faith-Based Organizations) []
1) Effective 2) Not Effective 3) Not Sure
6. Local leaders and/or opinion shapers (Village elders, Politicians, etc.) []
1) Effective 2) Not Effective 3) Not Sure
7. Other (Specify_____) []
1) Effective 2) Not Effective 3) Not Sure

Section 5: Challenges affecting responses to crimes and threats to forest ecosystems

24. (a) In your view, how often do members of the public report prohibited forest activities?
 1. Often []
 2. Rarely []
 3. Not at all []
- (b) If prohibited forest activities are rarely or not reported at all, what could be the reasons? (Multiple choice)?
 1. Fear of victimization []
 2. Corruption []
 3. Normalization of forest-related prohibitions
 4. Lack of trust in authorities []
 5. Lack of awareness on reporting points and/or mechanisms []
 6. Limited reporting points []
 7. They are beneficiaries of prohibited forest activities and/or products []
 8. Lack of evidence []
 9. Lack of awareness on protection of forest ecosystems []
 10. Other (Specify_____)

25. Based on your knowledge and/or experience, what are the main challenges in addressing prohibited forest activities and threats to forest ecosystems (multiple choice)?

1. Inadequate financial, human and infrastructural resources for protection of forest ecosystems []
2. Corruption []
3. Lack of political goodwill []
4. Laxity among responsible forest ecosystem protection duty bearers []
5. Inadequate involvement of local leadership in the protection of forest ecosystems
6. Complex legal frameworks []
7. Inadequate community participation in the protection of forest ecosystems []
8. Gaps in policies and government directives related to forest ecosystems []
9. Lack of and poor use of technology []
10. Lack of awareness on protection of forest ecosystems []
11. Other (Specify_____)

26. What medium of awareness creation against prohibited forest-related activities and threats to forest ecosystems has been used in this area?

1. Social media campaigns []
2. Community Barazas []
3. School programs []
4. Local TV and Radio []
5. Flyers and posters []
6. Religious forums []
7. Community policing (nyumba kumi) []
8. Other (Specify_____)

End



Appendix B: Key Informant Interview Guide for KFS/KWS/ NGO/CBO

ENVIROMENTAL CRIMES AND THREATS TO FOREST ECOSYSTEM IN KENYA

Section A: Patterns of Forest Crimes and Threats to Forest Ecosystems

1. What are the main types of prohibited forest activities you have encountered in the course of your work?
2. What forest products do these activities involve?
3. How are these prohibited forest activities carried out?
4. What other illegal activities are they closely associated with?
5. Which forest stations/blocks would you say are the most affected?

Section B: Drivers of Forest Crimes and Threats to Forest Ecosystems

6. What factors contribute to prohibited forest activities?

Section C: Actors and Flow Processes in Forest Offences Chain

7. Based on your experience, who are the actors typically involved in committing prohibited forest activities?
8. How are these actors interconnected?
9. Which existing hidden routes are used to transport prohibited forest products in your area of jurisdiction?
10. Which countries are the main international destinations for these products?

Section D: Responses to forest crimes and threats to forest ecosystems

11. What strategies currently exist in your organization for addressing prohibited forest activities?
12. Are these strategies effective?
13. What other strategies would you suggest?
14. What type of data on prohibited forest activities does your organization collect, record and store?

Section E: Challenges affecting responses to crimes and threats to forest ecosystems

15. What are the main challenges faced by your organization affecting the effective prevention and control of prohibited forest activities?
16. How can these challenges be overcome?



Appendix C: Key Informant Interview Guide for NGAO/NPS/County Law Enforcement

ENVIROMENTAL CRIMES AND THREATS TO FOREST ECOSYSTEM IN KENYA

Section A: Patterns of Forest Crimes and Threats to Forest Ecosystems

1. What are the main types of prohibited forest activities you have encountered in the course of your work?
2. What forest products do these activities involve?
3. How are these prohibited forest activities carried out?
4. What other illegal activities are they closely associated with?
5. Which forest stations/blocks would you say are the most affected?

Section B: Drivers of Forest Crimes and Threats to Forest Ecosystems

6. What factors contribute to prohibited forest activities?

Section C: Actors and Flow Processes in Forest Offences Chain

7. Based on your experience, who are the actors typically involved in committing prohibited forest activities?
8. How are these actors interconnected?
9. Which existing hidden routes are used to transport prohibited forest products in your area of jurisdiction?

Section D: Responses to forest crimes and threats to forest ecosystems

10. What strategies currently exist in your organization for addressing prohibited forest activities?
11. Are these strategies effective?
12. What other strategies would you suggest?
13. What type of data on prohibited forest activities does your organization collect, record and store?

Section E: Challenges affecting responses to crimes and threats to forest ecosystems

14. What are the main challenges faced by your organization affecting the effective prevention and control of prohibited forest activities?
15. How can these challenges be overcome?



Appendix D: Key Informant Interview Guide for KPA/KAA

ENVIROMENTAL CRIMES AND THREATS TO FOREST ECOSYSTEM IN KENYA

Section A: Patterns of Forest Crimes and Threats to Forest Ecosystems

1. What are the main types of prohibited forest products you have encountered in the course of your work?
2. How are these prohibited forest products concealed, packaged, ferried or transported?
3. What other illegal activities are they closely associated with these products?

Section B: Drivers of Forest Crimes and Threats to Forest Ecosystems

4. What factors contribute to local and cross boarder movement of prohibited forest products?

Section C: Actors and Flow Processes in Forest Offences Chain

5. Based on your experience, who are the actors typically involved in local and cross boarder movement of prohibited forest products?
6. How are these actors interconnected?
7. Which existing hidden routes are used to transport prohibited forest products in your area of jurisdiction, nationally or across the border?
8. Which countries are the main international destinations for these products?

Section D: Responses to forest crimes and threats to forest ecosystems

9. What strategies currently exist in your organization for addressing local and cross boarder movement of prohibited forest products?
10. Are these strategies effective?
11. What other strategies would you suggest?
12. What type of data on local and cross boarder movement of prohibited forest products does your organization collect, record and store?

Section E: Challenges affecting responses to crimes and threats to forest ecosystems

13. What are the main challenges faced by your organization affecting the effective prevention and control of prohibited forest activities?
14. How can these challenges be overcome?



Appendix E: Key Informant Interview Guide for KRA

ENVIROMENTAL CRIMES AND THREATS TO FOREST ECOSYSTEM IN KENYA

Section A: Patterns of Forest Crimes and Threats to Forest Ecosystems

1. What are the main products of illegal trade in forest products have you encountered in the course of your work?
2. How are these illegal forest products traded?
3. What other illegal activities are closely associated with trade in illegal forest products?
4. Which tax obligations do illegal trade in forest products violate?

Section B: Drivers of Forest Crimes and Threats to Forest Ecosystems

5. What factors contribute to illegal trade in forest products?

Section C: Actors and Flow Processes in Forest Offences Chain

6. Who are the actors typically involved in local and international illegal trade in forest products?
7. How are these actors interconnected?
8. Which existing hidden routes are used to illegally trade and transport forest products in your area of jurisdiction, nationally or across the border?
9. Which countries are the main international destinations for these products?

Section D: Responses to forest crimes and threats to forest ecosystems

10. What strategies currently exist in your organization for addressing local and international illegal trade in forest products?
11. Are these strategies effective?
12. What other strategies would you suggest?
13. What type of data on local and international illegal trade in forest products does your organization collect, record and store?

Section E: Challenges affecting responses to crimes and threats to forest ecosystems

14. What are the main challenges faced by your organization affecting the effective prevention and control of prohibited forest activities?
15. How can these challenges be overcome?



Appendix F: Key Informant Interview Guide for Judiciary

ENVIROMENTAL CRIMES AND THREATS TO FOREST ECOSYSTEM IN KENYA

Section A: Patterns of Forest Crimes and Threats to Forest Ecosystems

1. What are the main types of prohibited forest activities you have encountered in the course of your work?
2. What forest products do these activities involve?
3. What other illegal activities are they closely associated with?

Section B: Drivers of Forest Crimes and Threats to Forest Ecosystems

4. What factors contribute to prohibited forest activities?

Section C: Actors and Flow Processes in Forest Offences Chain

5. Based on your experience, who are the actors typically involved in committing prohibited forest activities?

Section D: Responses to forest crimes and threats to forest ecosystems

6. What strategies currently exist in your organization for addressing prohibited forest activities?
7. Are these strategies effective?
8. What other strategies would you suggest?
9. What type of data on prohibited forest activities does your organization collect, record and store?

Section E: Challenges affecting responses to crimes and threats to forest ecosystems

10. What are the main challenges faced by your organization affecting the effective prevention and control of prohibited forest activities?
11. How can these challenges be overcome?



Appendix G: Focus Group Discussion Guide

ENVIROMENTAL CRIMES AND THREATS TO FOREST ECOSYSTEM IN KENYA

Guiding Questions

Section A: Patterns of Forest Crimes and Threats to Forest Ecosystems

1. What are the main types of prohibited forest activities occurring in your community?
2. What forest products do these activities involve?
3. How are these prohibited forest activities carried out?
4. What other illegal activities and crimes are closely associated with prohibited forest activities?

Section B: Drivers of Forest Crimes and Threats to Forest Ecosystems

5. What factors contributes to prohibited forest activities?

Section C: Actors and Flow Processes in Forest Offences Chain

6. Who are the actors typically involved in committing prohibited forest activities in your community?
7. How are these actors interconnected?
8. Which existing hidden routes are used to transport prohibited forest products in your community?

Section D: Responses to forest crimes and threats to forest ecosystems

9. What strategies currently exist for addressing prohibited forest activities in your community?
10. Are these strategies effective?
11. What other strategies would you suggest?

Section 5: Challenges affecting responses to crimes and threats to forest ecosystems

12. What are the main challenges affecting the effective prevention and control of prohibited forest activities in your community?
13. How can these challenges be overcome?