LIVELIHOODS AND SUSTAINABLE CONSERVATION NEXUS AMONGST THE OGIEK COMMUNITY LIVING IN MAU FOREST, NAKURU COUNTY, KENYA

Rowan Alumasa Alusiola (BEd. Science)
N50/CTY/PT/23016/2011

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DECLARATION

Declaration by Candidate

This Research Thesis is my original work and has not been presented for the award of a degree in any other University.

Rowan Alumasa Alusiola
N50/CTY/PT/23016/2011

Signed:_____ Date: 02.05.2024

Declaration by Supervisors

This Research Thesis has been submitted for examination with our approval as the University supervisors.

1. Dr. Stephen Njoka Nyaga

Signed…… Date…….

2. Dr. Joseph K. Muriithi

Signed…… Date…….

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Abbreviations and Acronyms

Community-Based Organizations (CBO)

Community-Based Natural Resources Management (CBNRM)

Community Forest Association (CFA)

County Integrated Development Plan (CIDP)

Centre on Housing Rights and Evictions (COHRE)

Ecosystem-based adaptation (EBA)

Faith-Based Organization (FBO)

Forest Action Network (FAN)

Food and Agriculture Organization (FAO)

Gross Domestic Product (GDP)

Human Rights Organization (HRO)

Sustainable Development Goals (SDG)

Sustainable Forest Management (SFM)

Participatory Forest Management (PFM)

Protected Area (PA)

Tiger Task Force Report (TTFR)

Internally Displaced Persons (IDPs)

Integrated Regional Information Networks (IRIN)

Kenya Forest Service (KFS)

Kenya Wildlife Forest (KWS)

Mau Community Forest Association (MACOFA)

Mau Forest Complex (MFC)

Ministry of Environment and Natural Recourses (MENR)

Non-Timber Forest Products (NTFPs)

Non-Governmental Organizations (NGOs)

United Nations (UN)

United Nations Development Programme (UNDP)

United Nations Environment Programme (UNEP)

United Nations Conference on Environment and Development (UNCED)

Definition of Operational Terms

Poverty: Denial of comfort in relation to the absence of material revenue or utilization, low standard of health and education, and minimal opportunity for expression (Saunders, P.2004).

Forest Conservation: Protection, improvement or successfully creating of forests (Essama-Nssah, et al., 2002).

Socio-economic: Economic activity affects and is shaped by social processes. Analysis of societal progress, stagnate, or regress in relation with the local, regional, or global economy (Cinner J., 2000).

Livelihood: A means of securing the necessities of life (Chambers and Conway, 1992:6).

Sustainability: that which Satisfies current needs while safeguarding the capacity of future generations to fulfil their own objectives. (United Nations, 1987).

Abstract

Forests play a crucial role in alleviating poverty among rural, forest-dependent communities. However, a dilemma emerges as these communities seek to sustain their livelihoods while the governmental bodies and stakeholders for conservation endeavor to safeguard and preserve forests. Balancing the dual objectives of livelihood sustainability and conservation poses a challenge for all parties involved. This study assessed the link between livelihoods, sustainable conservation, and the Ogiek indigenous community of Molo Sub-County. Three main objectives addressed by the study are: (1) to assess the socio-economic and environmental challenges facing the Ogiek community, (2) to analyze the sustainability of the main forest resources supporting the Ogiek community, and (3) to examine the challenges of collaboration between the Ogiek community and other stakeholders in fostering sustainable livelihood safeguarding Mau Forest. Applying a landscape approach framework, the study incorporated strategies that intersect and harmonize to facilitate the integration of agricultural and forestry issues. The target population of the study was 300 Ogiek community households and 12 representatives from Chiefs, HRG, CFA, and KFS, representatives. The study employed a purposive and stratified random sampling techniques. The primary survey tool used for data collection was questionnaires. The study gathered information through Focus Group Discussions and in-depth interviews with key informants. In conducting data analysis, the study utilized descriptive statistics, specifically focusing on frequencies and percentages, through the application of SPSS version 22. Our results indicate that the Ogiek community almost entirely relies on the forest for their livelihood. Moreover, the consequences of forest eviction on household livelihoods varied, with both adverse and beneficial impacts depending on the economic capacity of different households. We propose prioritizing the Ogiek community in all conservation programs, emphasizing their complete involvement across all levels of such initiatives. Additionally, it is recommended to diversify integrated sustainable forest livelihood programs to meet Ogiek's varied needs. To mitigate existing conflicts, tenure reforms should explicitly define property rights, including the legal acknowledgment of customary claims.

1.0 INTRODUCTION

1.1 Background to the Study

Globally, forests provide goods and services crucial to human well-being (Miller & Hijjar 2019). Their services are critical for the functioning and growth of world economies (Ferraro et al., 2011). The monetary contribution to developing world economies is over US $250 billion annually (Agrawal, et al., 2013). Furthermore, an increasing body of research has illustrated the importance of forests as a source of livelihood for many rural dwellers who live below the poverty line in low- and middle-income countries (Babulo et al., 2008; Mamo et al., 2007; Nguyen et al., 2015)

Globally, approximately 1.6 billion people live near forests (Carr et al., 2021). Furthermore, the livelihoods of slightly above one billion people are reliant, to differing extents, on forests (Chao, 2012, FAO, 2015; Angelsen et al., 2014; Belcher & Dewi, 2015; Dokken & Angelsen, 2015). Moreover, one million people in rural areas and about 25% of the global population are supported by an estimated 3999 million hectares of forest for their livelihood. (FAO 2015).

In addition, approximately one billion people receive a substantial proportion of their revenue from forest extraction (FAO 2015), these includes industrial raw materials,fuel wood, construction material, medicinal plants for sale or consumption (Saha &Sundriya,2012 ; Langat et al. 2016; Mamo et al., 2007;Velded et al. 2004; Paumgarten 2005)and wild foods like bush meat ,snails, fruits, leafy vegetables, grubs, and snails(Pingali, 2015;Hickey et al., 2016; Ickowitz et al., 2014; Powell et al., 2013 ; Arnold et al., 2011).

Approximately 80% population of developing nations depend on the forest resources (FAO 2005) Moreover, the rural population’s revenues are sustained through exploitation of non-timber forest products (NTFPs) (Sunderland et al., 2004; Alexiades & Shanley 2005; Belcher &Kusters 2004). Equally, forests play a significant role of purifying the natural environment, and maintenance of ecosystem stability besides safeguarding of the hydrological cycle (Bisui et al., 2023).

Socio-economic factors that characterise households defines their utilisation of forest products and further determines how livelihoods are build (Angelsen et al., 2011; Senganimalunje et al., 2016). Access of households to forest resources is determined by site specific and household specific factors. Source of income, level of education, profession, size of land are examples that encompass household specific factors. (Coulibaly-Lingani et al., 2009). Moreover, involvement in communal establishments, access to market and the distance to and the presence of forest resources amongst others comprise site specific factors (Senganimalunje et al., 2016). The distance to accessibility of forest resources can lead to expedited forest resource extraction when there is forest access and availability of market for the resources (Mamo et al., 2007). However, on the other hand, distance can damage opportunities for farmers involvement in profitable activities (Gutierrez Rodriguez et al., 2009).

Forest dependent communities gain rights to access forest resources when they engage in communal establishments and forest user groups thus improving the reliance on forest resources. A sense of ownership is generated which leads to active participation towards forest conservation activities. (Kabubo-Mariara,2008). Additionally, seasonal change has an impact on collecting and exploitation of forest resources due to change in the accessibility of labour within the year. Furthermore, seasonality also affects forest products demand throughout the seasons (Yemiru et al., 2010; Senganimalunje et al., 2016).

In the Peruvian Amazon, the products resulting from the forest accounts for more than 60% of average total rural household revenues (L'Roe &NaughtonTreves, 2014). In India, forest ecosystem contributes to 40-60 percent of the total income to people's livelihood (Kumar et al., 2010). Additionally, 20 to 25 kilograms fuelwood are estimates used by each household amongst the rural community (Singh et al., 2010). Nepal's and Myanmar's forests are a vital renewable resource base that directly impact people's livelihoods and food security (Tint et al., 2011). Similarly, 80% rural Nepalis engage in fuelwood gathering for

personal consumption. (Meilby et al., 2014). In Bangladesh, people living around protected areas exploit various forest resources for their subsistence for example NTPFs (Mukul et al., 2016).

Borneo's rural community eats seven hundred different wild and semi-wild flora (Christensen, 2002). Equally, an approximated average of ninety to one hundred wild plant food species are used in Asia and Africa (Bharucha& Pretty, 2010). In Indonesia,51% of the food comprise of wild meat (Rasmussen et al., 2017). In the same way, the Amazonian rural communities' meals eaten, 11% o contain bush meat (Van Vliet et al. 2014b).

Africa harbours 25% of the world's remaining rainforest (Nchanjia et al., 2023). Additionally, Katerere et al. (2009) argues that a vast expanse of 582 million hectares in sub-Saharan Africa is covered by forests. Various plant and animal species that support healthy and resistant ecosystems exist in these forests. African poor households fully depend on environmental resources (Angelsen, et al., 2011). This is because they are characterized by livelihood options that are limited, and are more reliant on forest services as compared to households with higher economical standing for certain forest resources (Vedeld and Sjaastad, 2013)

In sub-Saharan Africa, over 70 per cent of the population depends on forests for income, livelihood, and sustenance (Nchanjia et al., 2023). Forests are a home for nearly three hundred million people, among them the 60 million are indigenous people (Jiwot et al., 2021). In the same manner, forests contribute to rural livelihoods by serving as 'safety nets' in response to shocks or crises. (Babigumira et al., 2014). Furthermore, forest resources such as river basins and biodiversity are essential provision of food and medicinal for the local forest dependent communities (Duguma et al., 2019).

In south Africa for example, the leading forest resources derived from communal forests include wild herbs and wild fruits (Rasmussen et al., 2017). Likewise, every year, five to six million tons of bush meat were collected in the Congo Basin (Nasi et al., 2011). In Burkina Faso, revenue collection of environmental resources averaged at 28% for each

household (Pouliot, 2012). Similarly,39% of the household income is contributed by the forests in Ethiopia's highland, (Mamo, et al., 2007) and Zambia at 43% (Kalaba et al., 2013).

Likewise, in Malawi, 30 % of income for of all household income is from forest prod, in Mozambique at 25 %, Uganda at 26 % and overall, in seventeen developing countries the income is placed at 22 % thus contribute significantly to households in the rural areas of Africa (Senganimalunje et al., 2016). Consequently, in Cameroon, the dependence of poor rural households on the natural resource base is significant (Lambi, et al., 2012). Among the Tanzania's local low-income agro-pastoral communities, exists major reliance on environmental resources (Mfunda & Røskaft, 2010; Knapp, 2012).

High value is placed on Kenyan forests in terms of economic, environmental, social, and cultural. The forest sector employs an estimated of over 50,000 people directly and 300,000 indirectly. Additionally, more than 530,000 households living in forest reserve proximity hinge on them for livelihood support. (KFS, 2017).

Mau Forest Complex (MFC) is Kenya's the most significant 'water tower,' a term used for montane forests that captures water which eventually flows downstream (Chrisphine et al., 2016). Twelve rivers that flows into Lake Victoria, Natron, and Turkana harbours their main water sources at MFC. Six million people in the nearby community and the urban centres use the water from MFC (Olang 2011). Additionally, MFC is significant to rural populations that depends on rain-fed farming (Wolff, 2011). MFC is also amongst the most crucial honey-producing areas of Kenya (Olang, 2011). Living in MFC are the Ogiek community, amongst the last remaining hunter-gather in Kenya. Their cultural believes and traditions are unique and are linked to the MFC.

Deforestation and degradation in the MFC are an urgent matter (Chrisphine et al., 2016; Jacobs et al., 2017; Miller et al., 2021). This has been caused by anthropogenic activities for example logging over the past century (Were et al.,2013: Klopp & Sang 2011). Between 1973 and 2013, one quarter of its entire forest cover had been lost (Swart, 2016). Furthermore, between 2010 and 2016, disruption had occurred

on 42.4% of the Western Mau Forest (Brandt et al., 2018). Overall, over the last 40 years, 850 km2 or 43.5% of the Eastern part has been (Kweyu et al., 2020).

Over the past decade, efforts designed to halt deforestation in the MFC have been initiated by different stakeholders including the government, international development agencies, private sector, and local communities among others (Miller et al., 2021). Various initiatives have been launched and adopted for example AFR100 and Intended Nationally Determined Contributions (INDCs), Reducing Emission from Deforestation and Forest Degradation in Developing countries (REDD+) programme, and Voluntary Partnership Agreement (VPA), among others (Jebiwott et al., 2021) Despite all these, there is limited research and scarce data linking forests and livelihoods that can steer sustainable forest conservation. This study analysed the link between forest dependent Ogiek community's livelihoods and sustainable Mau Forest conservation in East Mau, Kenya.

1.2 Statement of the Problem

The livelihood of the Ogiek community is reliant on forest resources. Forests consequently provide a prospect for advancement while simultaneously posing a hurdle in attaining conservation targets (Timko et al., 2010). Past development efforts to conserve forests e.g., Ogiek community members have been the central focus within Mau Forest, emphasizing the development of natural capital, while scant attention has been given to how these natural resources, when combined with other assets, will help sustain or improve their livelihoods.

This lack of attention has resulted in a failure to recognize the contribution of forest products to sustainable livelihoods. Seemingly, awareness on forest contribution towards attaining sustainable livelihood, poverty alleviation and effects of conserving forests is limited. Lack of efficient advocacy and inadequate forest statistics and valuation contribute to the situation.

The Ogiek community has coexisted with the MFC since time in memorial and relied entirely on the forest for their means of living. The community's traditional lifestyle has been threatened over time. In recent times, the government of Kenya has claimed that community is a threat to MFC's conservation and thus forcefully evited them. These evictions have led to devastating negative impacts on the social and economic aspects of Ogiek's livelihood. The Ogiek have however actively opposed the evictions and filed numerous claims against the government. The resistance has caused severe conflict between Ogiek and the government, making the already delicate situation worse.

In this regard, there is an urgent need to acknowledge the significance and potential of the forest sector in promoting sustainable livelihoods. Although, in recent years there has been a growing interest in linking forest dependent communities to forest conservation, limited attempt to systematically assess the linkage is available. To achieve forest conservation goals while simultaneously securing forest livelihoods has been the dilemma. The research therefore assessed the link between livelihoods, sustainable conservation and Ogiek indigenous community of Molo Sub- County.

1.3 Objective of the Study

The study's primary objective is to assess the link between livelihoods, sustainable conservation, and Ogiek indigenous community of Molo Sub- County, Nakuru, Kenya. The following specific objectives guided the study.

i. To analyze socio-economic and environmental challenges facing Ogiek community within Mau Forest in Molo Sub- County.

ii. To examine sustainability of the main forest resources that support Ogiek community's livelihood in Molo Sub- County.

iii. To assess collaboration challenges between Ogiek community and other stakeholders in promoting sustainable livelihood and conservation of Mau Forest in Molo Sub- County.

1.4 Research Questions

i) What are the environmental and socio-economic challenges being faced by Ogiek community households of Mau Forest?

ii) How sustainable are the main forest resources that support Ogiek community household livelihood?

iii) Does the Ogiek Community households experience challenges in collaboration with the Government and Civil Society Organizations on sustainable livelihood and forest conservation?

1.5. Rationale of the Study

This research identified the current livelihood strategies and economic activities of the Ogiek community. It included exploring how changes in forest resource availability and accessibility influenced Ogiek's livelihood choices and whether alternative revenue-generating activities have been adopted. Furthermore, the assessment of the link between livelihoods and sustainable conservation critical for the development of effective conservation strategies consistent with the needs and expectations of the Ogiek community.

Similarly, this study analysed the impact of conservation efforts on the community's livelihoods and explored possible pathways for achieving sustainable forest conservation practices that are also beneficial to Ogiek community. Moreover, historically Ogiek community has encountered marginalization and challenges in defending their land and resource rights.

By examining the link between livelihoods and sustainable conservation, this study enhanced the comprehension of how conservation practices can be aligned with the rights and aspirations of Indigenous communities. Furthermore, the research findings conveyed elaborate insights to forest conservation stakeholders, encompassing policymakers, conservation practitioners, and local communities. These insights explain the details of the relationship between livelihoods,

sustainable conservation, and the Ogiek Indigenous community. Consequently, guiding the formulation of more inclusive and sustainable conservation policies and practices. These endeavours aim to strengthen the livelihoods and rights of Indigenous communities, while simultaneously upholding the commitment towards forest conservation

Furthermore, this study has made a significant contribution to the global agenda on sustainable development. These include the United Nation (UN) agenda 21 of 1992 on recognizing and strengthening the role of indigenous people and their communities, World Summit on Sustainable Development of 2002, UN Conference of Sustainable Development (UNCSD) of 2012 and Sustainable Development Goals (SDGs) specifically on SDG 1 ending poverty in all its form everywhere and life on land. Additionally, the study has contributed to Kenya Constitution of achieving the 10% goal of forest cover of the total land area in pursuit of Vision 2030 goals. Further it has contributed to the County Integrated Development Plan (CIDP) and County Vision and Strategic Plans.

Finally, this study has made a substantial contribution to existing knowledge, addressing gaps, providing perspectives into sustainable forest-based livelihood integration and the structure of policy. These findings act as the vital intersection between sustainable livelihoods reliant on forests and conservation efforts. By examining these interconnections, this research offers valuable insights towards tackling conservation challenges, promote social justice, and enhance the well-being of the Ogiek community and their adjacent ecosystem.

1.6 Conceptual Framework

In this section, we briefly explain two conceptual frameworks: forests as pathways to prosperity framework and sustainable livelihood approach (SLA). Furthermore, we give a detailed description of the landscape approach by Carl Troll which is adopted by this study.

A conceptual framework for analyzing forests as pathways to prosperity adapted from typologies (Angelsen et al., 2014; McKinnon et al., 2016) argues on expanded conceptual framework that directs attention to a more comprehensive range of dimensions of human well-being. It facilitates analysis of whether and how forest conservation, management, and use provide a pathway out of poverty. The framework, however, focuses more on livelihood improvement than on forest resources sustainability.

Sustainable livelihood approach (SLA) developed by Chambers and Conway (1992) defines sustainable livelihood as (…) A livelihood comprises the capabilities, assets encompassing both physical and social assets alongside the necessary actions for sustaining existence. Sustainability in livelihood is demonstrated when it possesses the capacity to endure, rebound from pressures and unexpected events, and continuously strengthen its abilities and resources, while not undermining the natural resource base (…) (Ashley and Carney 1999). Environmental and social aspects encompass SLA. Drawing ideas from Chambers (1992), human well-being and capabilities are the major aspects of the framework. The major challenge of this framework is measurement and comparison of capital assets- human, social, physical, financial, and natural.

In consideration of the challenges with forests as pathways to prosperity framework and SLA, this study adopts the landscape approach by Carl Troll because it integrates both agricultural and forestry issues and it recognizes interconnection between land uses and different stakeholders (GLF,2015). In this study, the framework is seen

as a management of forest land by dependent communities for sustainable forest resources and non-forest-based livelihood.

The dependent variables in this study include conserved forest, improved livelihood, successful collaborations, water shed protected and climate balance**. (A)**Demands on landscape is the independent variable. The study assumes that habitat productiveness, regulatory, social, and economic objectives are supported by multifunctional landscapes (Mander et al., 2007) including fuel wood, private farms, small holder agriculture, cash crop(tea), communal forestry and water shed functions. Time frames can differ in the products and services, benefiting a variety of stakeholders with differing rights, access, resource management and power over decisions. Managed multifunctional land use systems through integration of approaches can promote livelihood, conservation, and sustainability. (Mbow et al., 2014).

This study identified intervening variables including:**(B)** a sustainable livelihoods framework.Resource base integrity is paramount for a livelihood to be sustainable, as it must withstand and recover from stresses and shocks while continuously enhancing its capabilities and assets, without compromising the present or future. **(C).** These are principles to landscape approach, and they work hand in hand. The study assumes that promotion of resilient actions is needed to investigate threats to allow recovery after a concern. Processes and benefits must be sustained through maintaining and strengthening resilience. This can be improved through strengthening stakeholders' capacity.

Continual learning from outcomes can improve the management of landscapes. Continual adjustment is required in the learning and revision to derive new knowledge from several sources. Finally, for successful forest conservation, the recognition of all stakeholders is key. **(D)** Ecosystem-based approaches (EBA) shall promote integrated land management, for equitable sustainable forest conservation. It

recognizes humans as an essential part of ecosystems and establishes successful collaborations among stakeholders. **(E)** A combination of the intervening variables will lead to a balance in climate, watershed protection successful collaboration that will aid in the livelihood of the Ogiek community and successful forest conservation. A tentative framework was developed from the above conceptual and theoretical approaches in Figure 1.

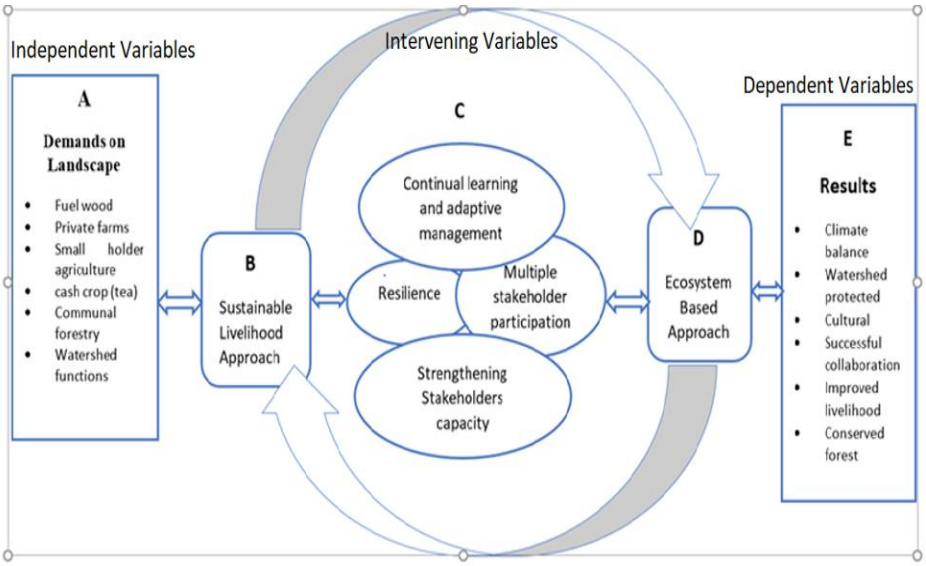

Figure 1 Tentative landscape approach for analysing household's livelihood strategies and forest conservation

Source; Author,2022.

The conceptual framework aided the study in data collection, by putting together traits of landscape styles that were used to identify the research area. Further in identifying and analyzing the presence of legitimate coalitions or networks of stakeholders governing MFC to achieve impact by shaping outcomes of actors.

Additionally, financial assets, and a spatial inventory of natural, physical, social, and human assets were sought within Kenya Forest Service. Finally, the framework aided in developing a metric useful for measuring the effectiveness of the landscape approach linked with livelihood improvement for the study area.

2.0 LITERATURE REVIEW

2.1 Introduction

Literature related to this study has been reviewed thematically and guided by the specific objectives. Identification of existing knowledge gaps regarding the link between livelihood and conservation as per the study goal was filled. This section is divided into four parts: (i)Socio economic and environmental challenges faced by forest-dependent communities (ii) Sustainability of main forest resources supporting forest-dependent communities(iii)Collaboration challenges for local communities (iv) Literature and Identification of Research Gaps.

2.2 Socio-Economic and Environmental Challenges Faced by Forest-Dependent Communities

Protected Areas (PAs) have been used by governments and international communities in halting biodiversity loss, and ecosystem degradation to achieve global climate and development priorities. According to Corpz et al., (2020) however, the creation of fortress conservation through investment in PAs negatively affects land and the rights of communities to access the forest. At the regional level, countries experience mixed impacts of PAs on the poverty index differently (Sims 2010; Ferraro and Hanauer 2011; Pfaf et al.,2014; Canavire-Bacarreza &Hanauer 2013; Clements et al., 2014).

According to Sims (2010), if people need to change their livelihood after a ban on resource access, this may result in an important unintended consequence of the PAs. Pils (2016) details reasons why forced evictions undermine the elimination of poverty. Household characteristics affect the diversity in PAs impacts (Foerster et al., 2011).

Further concerns have been raised by environmental economists and policy makers about whether establishment of PAs negatively affects people's livelihood by limiting resources from the forest or positively by creating activities for ecotourism. (Adams et al.,2004; Pullin et al., 2013; Baylis et al., 2016).

In their 2011 study, Buckles et al. depict the experiences of neglect, exploitation, and subsequent eviction faced by the Katkari tribe in India.

Vernizzi (2011), illustrates how the founding of national parks resulted in the massive displacement of indigenous inhabitants in USA. Islam & Mungai (2016) concludes by indicating that forced evictions adopt different approaches and differ depending on the circumstances.

In Africa, while causes of eviction may be historical through either colonialism (Evers & Kooy, 2011) or development, three case studies show a tendency towards the eviction of indigenous groups due to nature conservation (Maravanyika 2012). In their study, Baird et al., (2013) elucidate that eviction serves as a disruptive force or unexpected event influencing the development of diversification strategies in emerging economies. The research also suggests that the potential for adverse impacts from eviction-induced shocks can be particularly concerning in regions where residents live in proximity to subsistence levels, as even a slight decrease in household income could have catastrophic consequences.

Cavanagh, (2012) argues that encroachment of protected areas for agriculture and livestock is a challenge for nature conservation in developing countries. This is caused by population pressure around the park and with increased poverty levels (Cavanagh,2012). In conclusion Vangen, (2009) and Cavanagh (2012) indicate that people encroach because of restricted access to resources they used to access freely before the rights were denied.

2.3 Sustainability of Forest Resources for Dependent Communities

Traditionally, increased wood production and economic profit were the main objectives of forest management. In the recent decade, however, a shift of focus from sustained yield management to sustainable forest management (SFM)has been due to the need to consider other goals (Hahn & Knoke 2010). Globally, this had been embraced as a predominant forest management paradigm (MacDicken et al., 2015). SFM goal is to balance socio-cultural, ecological, economic forest functions. This aligns with the United Nations Conference on Environment and Development (UNCED) held in 1992,

Rio de Janeiro and the adoption of forest principles (Hahn& Knoke 2010).

Ecosystem services recognizes the dependency of human welfare multiple benefits received from the environment and its link with SFM concept (Quine et al.,2013).As acknowledged by several studies, ecosystem services (ES), are increasingly planned, priced, and marketed(Schomers &Matzdorf 2013;Wangai et al.,2016; Hansen &Malmaeus 2016; Englund et al.,2017; Costanza et al.,2017,2018).Multiple ecosystems across landscapes ought to be managed and balanced (Triviño et al., 2015; Nelson et al., 2009; de Groot et al., 2010).Deal et al., (2012), concludes that SFM goes hand in hand with preserving forest ecosystem services, SFMs potential can be enhanced by valuation and marketing of ES . Furthermore, Biber et al., (2015), argue that to some extent, forest ES are sensitive to tradeoffs and management and collaborations between wood production and ES. Nordström (2010), advocates for multi-stakeholder approach in forest ecosystem services across landscapes.

In successful natural resource management, governance has been identified as a lynchpin (Potts,2019). Collaborative, participatory, and polycentric governance structures have been adopted by several groups and governments (Yeboah et al., 2017; Bixler 2014). Several authors argue that major experimentation have been used in this revolutionary shift in governance with including novel approaches to decision-making, that has brought out different levels of success and influence on outcomes in social-ecological systems (Potts et al., 2016; McFadgen &Huitema 2017).Further studies have however shown that in practice, achieving such principles is a challenge to the success of management of natural resource, planning and activities implementation(Waylen et al., 2018;Petursson & Vedeld 2017; Dale et al., 2016;Potts et al., 2015;Kuzdas et al., 2015).

In this regard, Kenyan government has placed forest conservation agenda with high significance, which reflects its policies and legislation. Forests Act, 2016 is among the core relevant policies to forest conservation. Moreover, there exists other laws associated with

land restoration and their associated ecosystems. They include the 2010 Constitution that calls for maintaining and restoring a tree cover of at least 10 % of the country (GoK, 2010c). By 2030, the National Climate Change Response Strategy requires growing about eight billion trees on 4.1 million hectares of land (GoK, 2010b).

Programs on conservation of indigenous forests in the Kenyan water towers are underway through Kenya's Vision 2030 (GoK, 2007). One billion trees planted with a goal of and increasing forest and employment creation for the youth (GoK, 2007). Furthermore, reducing emission form deforestation and forest degradation (REDD+) readiness preparations are also underway with an objective of enhancement of forest carbon stocks. Established under the Forest Act of 2016, the Kenya Forest Service (KFS) assume the sole responsibility of conserving, managing, and utilizing forests and their related products (MENR 2005, and 2016).

The Act provisions for Participatory Forest management (PFM) to engage forest dependent local communities with the government in forest management (Kimutai & Watanabe, 2016) leading to the creation of Community Forest Associations (CFAs) (Kairu et al., 2018). To reach the recommendation of 10% forest cover, KFS had a plan of increasing forest cover by 670,000 hectares in the year 2020, partly through engagement with the CFAs (KFS,2017). Over the past decade, improving forest-management has been an important target in forestry sector amendments (MENR, 2016). In addition, due to devolution, the county governments are obliged to develop spatial plans and forest conservation strategies (GoK, 2014). The Kenyan Constitution 2010 reinforces the Forests Act, 2005 (KFS 2010).

2.4 Collaboration Challenges for Local Communities

PFM impacts forest conservation positively (Takahashi &Todo 2012). However, there is a poor understanding of the welfare implications related to household engagement in PFM. Additionally, PFM has not met its pledge of on distribution of economic and social benefits equitably to people living adjacent to forests (Lund & Treue,

2008; Lund & Saito-Jensen, 2013; Persha & Meshack, 2016; Green& Lund,2015). PFM has brought about new rules and regulations that restrict livelihood options related to forest (Larson et al., 2013) leading to decline in forest-based income.

Similarly, global forest governance has seen a rise in market type approaches (Scheba, 2017; Andersson et al., 2018;). Several studies urge that that the market approach was used to solve the challenges of PFM and conservation and sustainable use tradeoffs (Burgess et al., 2010; Blomley et al., 2017). Therefore, solutions in combatting deforestation and forest degradation through frameworks like REDD+ (Bhagwat et al., 2017) have been adopted. However, the backbone of piloting of the market-based approaches (MBA) such as REDD+ has been through the existing forest governance approaches such as PFM (Khatun et al., 2015; Blomley et al., 2017). These approaches have manifested problems, for example violent eviction of communities living adjacent to forests (Chomba et al., 2016). Consistency of MBAs as environmentally effective or cost-efficient is lacking (Muradian et al., 2013). Additionally, their implementation is difficult in the setting where forests are dependent on unformalized legally customary use rights.

There exists a weak legal basis when paying people for non-use of a resources not officially theirs (M. Veronesi et al., 2015). Moreover, several authors argue that there exists complexity of MBA design with weak property rights, counter productivity can occur and trade-offs between environmental and poverty alleviation purposes may be involved (Corbera et al., 2007; M. Veronesi et al., 2015; Engel et al., 2013). Moreover, groups such as local communities always hold customary rights, thus provoking issues of a common's dilemma (Zabel et al., 2014).

Internalizing externalities is the idea that most MBAs go by (Engel et al., 2008). However, s authors claim that the use of this approach means ecosystem services are not purchased or sold by people (Schomers and Matzdorf, 2013).

2.5 Summary of literature and isolation of study gaps

The foregoing review has shown the existence of relevant literature for this study. Over the past decade, heightened recognition of the influence of forest resources on the livelihood of communities living near forests has been emphasized. Nevertheless, challenges persist in drawing effective comparisons between human reliance on forests, conservation of environmental resources and achieving successful collaborations among stakeholders. The prioritization of the daily requirements of forest-dependent populations within forest contexts remains inadequate.

Furthermore, adjacent forest communities lack awareness of the values associated with ecosystem services, leading to a lack of well-documented sustainable forest management practices. Despite collaborations between forest-dependent communities and other stakeholders, the issue of sustainability in forest conservation persists. Additionally, conflicts arise between forest conservation efforts and the livelihoods and active involvement of communities in such endeavors. Adequate attention to the root causes of existing conflicts is lacking.

3.0 RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

Turato (2000), defines methodology as a systematic study of methods that have been used within a discipline. It therefore gives a description of the methodology and procedures that was used in this study, considerable in attaining the set research objectives and goals as per the study requirements. The research design and methodology outline the framework through which relevant data was collected and analysed. This section therefore presents detailed discussion, research design nature and sources of data, sampling, data collection and data analysis methods and presentation in investigating the study problem.

3.2 Study Area

The study took place in Mariashoni ward of Molo sub-county, Nakuru county. It covers an area of about 250 Km2 in the north-eastern part of the Mau Forest complex.

The area has a population of 12,000 people, among them are Nandi, Kikuyu, and Kipsigis, 4000 are Ogiek. There are 3250 households (KNBS REPORT 2019). Its area is 167 square kilometers with 389 people per square kilometer. In Eastern Mau Forest region, Mariashoni (S 0° 22′ 06″ E 35° 49′ 28″) is a critical trading and business centre. Cash crop farming for potatoes, peas and maize contributes to the area's economy. In addition, livestock rearing of cattle, sheep and goats and subsistence farming is practiced. The small villages for the Ogiek are situated far from the forest, often in the middle and lower altitudes (Zocchi et al., 2020). As shown on figure 1 below.

3.2.1 Topography

The North-eastern MFC it is made up of hills, plains escarpments, and rolling land (Figure 1). Its topography is rolling land with slopes that vary from 2% lowland to over 30% in the foothills. The slope between 2-4% stretches over an area of 40ha (Kimotho, 1990). However, a few areas are low lying, with slopes that range from 1-2% that stretches about 72 ha (Kimotho, 1990). Many wildlife species is

supported by this topography. The distinctive genetic richness extends to the presence of rare and endangered species, e.g., forest elephants. Its altitude ranges between 1800 to 3000 meters above sea level. Quaternary and tertiary volcanic deposits are comprised in the region (Sombroek et al., 1980).

The northern part of the complex is covered with sediments while in the southern black ashes and welded tuffs are predominant. Based on the altitude, the MFC soils are divided into two groups -high and low altitude soils. Luvic and Plinthic Phaeozems comprise the high-altitude soils (Kimotho, 1990). High content of silt and clay resultant of Ferrosols, Nitisols, Cambisols and Acricsols constitutes soil in the high altitude (World Soil Information [ISRIC]/FAO-UN, 1995). These soils have a good drainage, dark greyish brown colour, brittle sandy clay loam that is the basis for the topsoil that is deep brown ranging from 5-36cm deep (Kimotho, 1990). The PH ranges from ranging from 5.2-6.3, meaning they are strongly to slightly acidic (Kimotho, 1990). The soil in the lowland are Dystric Gleysols and Piso ferric phase with pH between 5.6 to 6.4 (China, 1993). The depth is 10-25cm with poor drainage, extremely dark grey as indicated in Figure 2.

3.2 .2 Climate

3.2.2.1 Rainfall

The climate is influenced by the modification of the North-South movement of the Inter-tropical Convergence Zone (ITCZ) due to local orographic effects. May and June typically encounter the long rainy season, while a shorter rainy period occurs from September to November. The rainfall annual average is about 1300 mm on normal years bereft of extreme weather like El Niño. The mean monthly rainfall ranges between 30 mm to above 120 mm. (Figure 3).

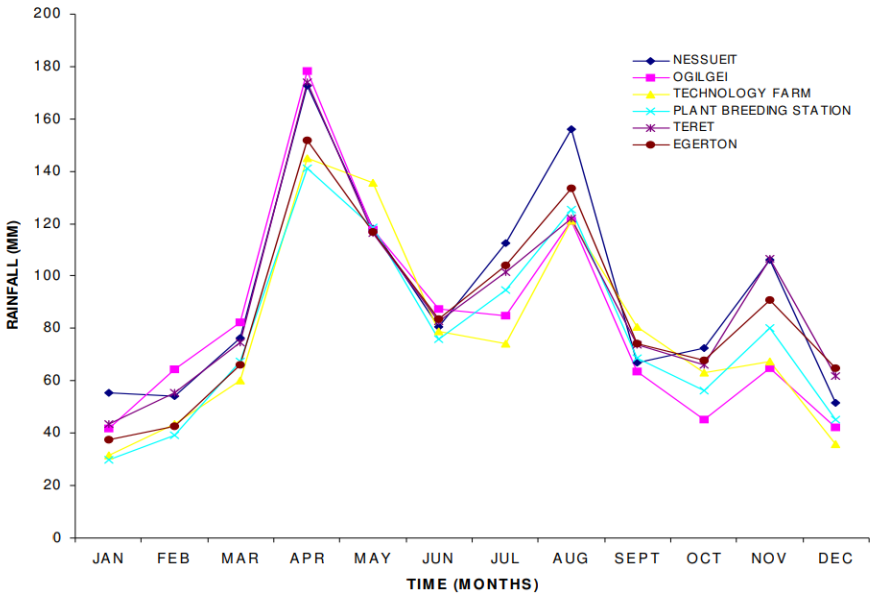

Figure 3; Distribution of Monthly rainfall from six weather stations in MFA
Source; Kundu, (2007)

3.2.2.2 Temperature and Evapotranspiration

Under classification from moisture indices, average evapotranspiration and amounts of annual rainfall, the North-eastern MFC falls in agro-climatic zones I, II and III. Yearly estimation of actual mean air temperature is complicated by its various topography. However, based on altitude zones, the monthly air temperature assessments are as presented in Table 1. Evapotranspiration annual average estimates between 1.3mm/day to 4.2 mm/day, at an average of approximately 3.85 mm/day. Additionally, the temperature is cold with a mean temperature of 10-15°C. The North-eastern Mau is the main upper catchment of river Njoro, Naishi Makalia, and Nderit flowing into Lake Nakuru.

3.2.3 Vegetation and land cover

Montane forests cover the high-altitude area giving way to forest mixed with grassland and woods of African bamboo, finally, near the escarpments there exists montane sclerophyllous forest (Birdlife International, 2013). Logging has been rampant in the recent year that has led to pioneer tree species such as *Conopharyngia stapfiana Stapf* colonizing the area. Different tree species for example *Olea europaea*

L. subsp., Wall. ex G. Don Cif, Prunus Africana, *Podocarpus latifolius* among others can be found (Birdlife International, 2013). Large parts of the high Juniperus virginiana L. have been deforested, (Birdlife International, 2013). Some of the areas have been cultivated. Maize, Irish potatoes, wheat, peas, and wheat grow in this area. The cattle also graze the fields.

3.3 Study Design

This study used descriptive survey because it governs and reports how things are and describes them as values, characteristics, and behaviour, (Mugenda 2003). As per Gay (1981), descriptive research involves gathering data to examine hypotheses or address inquiries concerning the importance of the subjects under study. Hence, this design is suitable as it focuses on the link between ongoing forest conservation initiatives and the sustenance of livelihoods within the forest-dependent community. Questionnaires were utilized as the research instrument. The data collected aided in formulating recommendations for this study.

3.4 Sample Size and Sampling Procedures

3.4.1 Sampling Location

The research study took place within Mariashoni ward, situated in Molo Sub-County, adjacent to the border of Mau Forest. The ward has a mixed settlement of different communities. The selection of this area was deliberate, primarily due to its proximity to the forest, which experiences significant encroachment and degradation. Moreover, numerous rural households rely on forest resources for their livelihoods within this region. Additionally, many developments civil society organizations have projects in this area. The study was conducted in two villages, specifically Kiptunga and Kitiro. Owing to constraints in resources, both in terms of time and finances, the researcher could not gather data from all the villages within Mariashoni ward.

3.4.2. Sampling of Households

Purposive sampling was used to choose Ogiek as an exclusive group from the mixed settlement. The target population of the study consisted of a sample of three hundred households in two villages. Respondents were chosen from households residing within a five-kilometre radius. Meffe and Carrol (1994) contend that the community's influence and engagement with the forest diminish as their distance from it increases. To achieve the sample size of 300 participants, purposive sampling was employed to select households residing near the forest and within the specified radius.

$$n = \frac{\frac{Z2 * p(1-p)}{e2}}{1 + (\frac{Z2 * p(1-p)}{e2N})}$$

Where: *n*= Sample size **(300)** | N= Population Size **(75,000**) *e*= Margin of error **(9.8)** | Z= Z-score at 95% confidence level **(1.96)**

3.4.2 Key Informants

The study's key informants included the leadership of the Mau Forest Kenya Forest Service (KFS) staff comprising of two conservators and a forester, a representative from human rights groups-Ogiek peoples development program, chair of the council of elders and chief. They were a total of ten in number. They were purposively selected based on their knowledge and involvement on the issues under investigation as summarised in Table 3.1.

Table 3.1: Key informants

Stakeholders	**Sample population**
Government Agencies (KFS)	2
Representatives from Local NGO(HRG)	3
Representatives from CFA	4
Village Elders and Chiefs	3
TOTAL	10

Source; Author

The respondents were stratified into two groups: Ogiek community households and key informants. Those interviewed using the questionnaire were sampled using cluster method. This method was applied to enable the researcher to get a certain number of the respondents to be interviewed in each of the two villages. Village-based purposive sampling was utilized to choose 150 respondents from each..

Drawing a sample of a population to enable each member to have an equal chance to be selected (Kerlinger, 1964). Purposive and snowball sampling was done to identify key informants who were interviewed through in-depth interview guide and Focused Group Discussions (FGDs). The researcher used personal judgement to select a sample based on knowledge and specific purpose of the research (Frankel and Wallen, 2000).

3.5. Instruments

The questionnaire was used for data collection because it collects data over a large sample and thus time saving (Kombo&Tromp,2006). Questionnaires were administered to Ogiek community households, FGDs with local NGOs (HRG), and CBO representatives, local chief and Ogiek elders. In addition, in-depth interview schedules were

administered to government agencies (KFS), representatives to elicit a deeper understanding on how conservation relates to livelihood. Respondents were engaged to build rapport, explain the study's objectives, and address any uncertainties they might have had regarding the question. Both secondary and primary data was used.

3.6 Data Collection Procedure

3.6.1 Piloting Study

A limited number of respondents from Ndosua, an adjacent village to the study area, were chosen for the pre-testing of data collection instruments. This was conducted to assess their accuracy, as well as to validate their relevance and suitability for the upcoming data collection process. The pre-testing, conducted two months ahead of the field research, aimed to ensure the accuracy and relevance of data collection instruments. Familiarity with the respondents was established through socialization (Kvale and Brinkmann, 2009), along with active participation in locally organized activities, including chief barazas.

The findings from the pilot study played a significant role in identifying gaps and field challenges, addressing inconsistencies, and restructuring the survey instruments before the main data collection. Subsequently, the instruments underwent validation by experts within the study area, aligning with Mugenda and Mugenda's (2003) argument that a panel of professionals and experts in the same field provides a more robust assessment of validity.

3.6.2 Validity of Research Instruments

Research findings indicate that validity concerns the accuracy and significance of conclusions drawn (Mugenda, 2003). Questionnaires were administered to households residing near the forests in each village, as well as to the key informants involved in this study. The questions were designed to align with the three objectives and research inquiries . The research topic guided the selection of themes outlined in the literature review, which informed this approach. Questionnaire was structured in

simple English language and translation was by local research assistant to those who found it difficult to understand. Furthermore, rules about interviews were observed.

3.6.3 Reliability of Research Instruments

According to Mugenda (2003), reliability denotes the extent to which a research tool consistently produces dependable outcomes over multiple iterations. Reliability is affected by random errors, and as their occurrence rises, reliability diminishes. Moreover, it represents the deviation from an accurate measurement due to factors that have not been thoroughly examined by a researcher. To assess the reliability of the questionnaires, the split-half technique was consequently employed. The researcher distributed questionnaires to the sampled groups, after which the scored items were randomly divided into three separate groups. The total scores from each subject across the three sets of items were calculated, followed by a correlation analysis of the scores.

3.6.4 Data Collection Technique

To extract accurate information from the respondents, participatory tools for data collection were used. Questionnaires were utilized to gather information concerning the relationship between forest-based livelihoods and forest conservation. Open-ended questions were used to assess the level of collaboration and local influences at the decision-making processes allowed for a greater depth of responses and gave an understanding of feelings, lifestyle, interests, and decisions of the respondents. Moreover, a filed research guide conversant with the community's complexity helped to identify suitable respondents and translate the questionnaires to Kiswahili and into the local language. Rating of responses and measuring of attitudes and feelings were Likert scale from 1 (extremely poor) to 5 (excellent).

The research lasted for twenty-five consecutive days due to the logistical experiences, and research requirements considering the mixed methodology. We used public transport -matatu and motorcycle (boda-boda) and by foot to reach our research areas. A systematic interview

schedule for the key informants was used to gather qualitative information using both open and closed-ended questions. This provided an opportunity to discuss issues not considered in the questionnaire to provide unique understandings to the study. Snowball technique was used to compliment the individual and in-depth interviews for key informants**.**

To gather and validate information collected from secondary sources, Focused Group Discussions (FGD) interviews were applied among the targeted key informants as summarised in Table 3.2. Photos were taken during field observation to help cross-check forest conservation measures, and the socio-economic activities undertaken in the area as shown in annex III. Field observation checklist entailed writing the socio-economic, environmental and livelihood activities, around Mau Forest in the two villages. Further, secondary data was collected through a desk review to collect information on documented case studies on the link between livelihood and conservation, relevant Journals, reports, manuals, and books, and material from relevant government agencies and NGOs were also reviewed. Grey literature was be reviewed too.

Table 3.2: List of Interviewees

Respondent's Name	**Sample Size**	**Affiliation**	**Sampling Method**	**Data Collection Method**
Respondent	1	KFS	Purposive	KII
Respondent	1	Chief	Purposive	FGD
Respondent	2	Council of elders	Snowball	FGD
Respondent	1	KFS	Purposive	KII
Respondent	1	KFS	Purposive	KII
Respondent	3	Human Rights Group	Purposive/snowball	FGD
Respondent	3	CFA	Purposive/snowball	FGD
Respondent	300	Ogiek Households	Purposive	Questionnaires

Source; Author

3.7 Data Analysis

Collected data encompassed quantitative and qualitative. The quantitative data underwent a cleaning process involving editing, coding, and tabulation. This was conducted to identify and address any anomalies in the responses, assigning specific numerical values to facilitate further analysis. After coding and assigning variables, we imported data into SPSS (Statistical Package for the Social Sciences), followed by a thorough cross validation process and analysis.

Subsequently, qualitative data gathered through focus group discussions and key informant interviews was recorded with audio devices and subsequently transcribed. Based on the research questions, the collected and transcribed data was then labelled, and anchor codes. We then coded relevant statements from participants, and using end note function, data was then organized under respective anchor codes. The initial codes were compiled into lists and grouped under their respective anchor codes, with frequencies tallied. The data was then categorized and organized into a thematic framework based on main

themes, concepts, and categories. These included Socio-economic and environmental challenges facing Ogiek community, sustainable conservation of Mau Forest, collaborations between Ogiek community and other stakeholders. For analysis, a framework-based approach was employed, as recommended by Ritchie et al. (2003). This framework aided in the comprehensive examination of issues raised by key informants, ensuring a thorough analysis, and providing flexibility in identifying and characterizing emerging data issues (Ritchie & Spencer, 1994). The data was then entered into SPSS for further analysis.

The analysis of data involved the application of both descriptive and inferential statistics. This method facilitated the organization of extensive datasets, enhancing the comprehension of specific observations within the study. Summary statistics, including means, standard deviations, and percentages, were generated. Furthermore, a linear regression analysis was employed to assess the correlation between various dependent and independent variables. Data was then presented using graphs figures and tables.

3.8 Ethical Consideration

Ethical endorsements from the Graduate School at Kenyatta University and Nakuru County Department for Water, Energy Environment, Natural Resources and Climate change, were approved before commencement of the research. Additional ethical considerations upheld throughout the study encompassed ensuring the confidentiality of participating respondents. This practice not only safeguarded their privacy but also fostered trust and rapport, maintaining ethical standards and research integrity. Participation in the entire process was voluntary, with no coercion of respondents, and the collected data was solely utilized for research purposes. The selection of respondents was carried out randomly to alleviate bias.

4.0 RESULTS AND DISCUSSION

4.1 Introduction

This chapter details the outcomes of the research findings and the analysis of the collected data in light of the stated hypotheses and aligned with the conceptual framework. The data analysis was presented under different headings grouped in line with the research objective.

This is followed by an assessment of the contribution of Mau Forest to poverty alleviation of the Ogiek community, the Sustainability of the main forest resources, and the Socio-economic and environmental impact of conservation on Ogonek's livelihood. Furthermore, we present results from legislation and institutional framework amendments for KFS. Finally, we present results on the Ogiek community's forest eviction compensations.

4.2 Response Rate

Ogiek community member households were issued a total of 130 questionnaires. The completed questionnaires were edited for completeness and consistency. Out of the 130 questionnaires that had been issued, only 125 were fully completed.5 questionnaires had missing data and were therefore not used for analysis. This represented a response rate of 96 % which was adopted by the study as adequate for analysis. According to Mugenda and Mugenda (2003), a response rate exceeding 60% is deemed sufficient for data analysis. Further, the study conducted an interview schedule with eight key informants composed of government officials from KWS, KFS, and members of HRG to get their responses on the four study objectives. This survey was conducted in the Kitiro, Kapcholola, and Dashatait villages of the Mariashoni ward.

4.3 Socio-Demographic Characteristics of Participants

The demographic information that was considered in this study for the respondents included the gender, level of education, the respondent's capacity to answer the questionnaire, and the number of people that make up a household.

4.3.1 Gender of the Respondent

The sampled population comprised both male and female respondents. As listed in table 4.1, out of 125 participants, male respondents formed 57.6% of the total respondents as compared to 42.4% of female respondents. Data collection occurred during the day when most of the women were busy with their daily chores. Additionally, men in the study area are more involved in community projects as compared to women. This might be the reason as to why the larger number of respondents were of the male gender.

Table 4.1: Gender Distribution

Gender	**Frequency *(f)***	**Percentage (%)**
Female	53	42.4
Male	72	57.6
Total	125	100

Source: Field Data (2022)

Furthermore, these results are consistent with the findings of Watkins, Zimmermann, and Poling (2014), who concluded that men exhibit a greater willingness to engage in community-based studies due to their traditional roles where they often serve as family heads.

4.3.2 Occupational Roles of Respondents

The study aimed at understanding the roles held by respondents at their workplace or home. Out of 125 participants, 5.6% of the respondents responded to the questionnaire in their capacity as chief and assistant chief. 67.2% were household heads,25.6% were spouses and 1.6% were others. The community in the study area regards men as the head of the household, this correlates with the higher number of male respondents, Table 4.2.

Table 4.2: Respondents Roles

Position Held	Frequency *(f)*	Percentage (%)
Chief/Ass. Chief	7	5.6
Household Head	84	67.2
Spouse	32	25.6
Other	2	1.6
Total	125	100

Source: Field Data (2022)

Of the 125 respondents,8% of the population did not have any formal education, they never went to school at all,47.2% of the respondents attained primary school level education,24.8% had attained secondary school education and 20% had vocational level education with diplomas and certificates. Taking the above statistics into account, one can conclude that a higher number of the participants were literate.

The participants were therefore able to understand and engage in the implementation of forest conservation programs. This heightened literacy level might be attributed to experiences such as forest evictions and land resettlement, which exposed the community to educational opportunities. Additionally, interactions with migrant communities, not indigenous to the area, may have influenced their attendance in schools. Furthermore, their involvement with international and local NGOs that work in the area (Ilaria 2016). This is summarised in Table 4.3 below.

Table 4.3; Educational level of Participants

Education Level	Frequency *(f)*	Percentage (%)
None	10	8
Primary/Middle	59	47.2
Secondary	31	24.8
Vocational/Technical	25	20
Total	125	100

Source: Field Data (2022)

4.3.4 Household Population

In the study area, out of 125 respondents, 7.2% of the respondents had over 12 people in their household,52.8% had between 2-5 people in their household,24% had between 6-8 people in their household and

16% percent had 9-11 people in their household as shown in Figure 4.1. The above statistics show that the average number of household members in the study area is between 2 and 5 people. This could be correlated to the increased number of people who have attained a basic education level and are exposed to modern information on family planning.

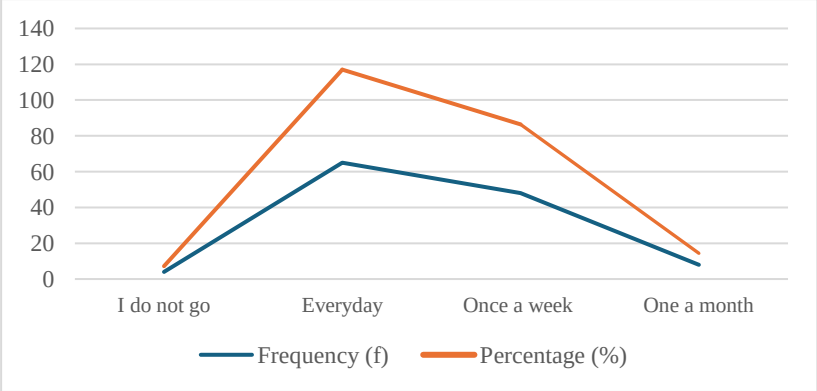

Figure 4.1: Household Population
Source; Field Data (2022)

4.4 Socio-Economic and Environmental Challenges Faced by Forest-Dependent Communities

4.4.1 Access to Mau Forest and Utilization of its Products and Services

In the study area, out of 125 participants, 92 % of the respondents acknowledged that they had access to a forest for its products and services while 8% of the respondents did not have access to the forest as indicated in Figure 4.2. In consideration of this analysis, the dependence of the Ogiek community on the forest comes out clearly. Additionally, on the flip side, this could be one explanation for the increase in deforestation of the Mau Forest. Our results are in line with Kibria et al., (2018) who argue that the well-being of communities reliant on ecosystems is intricately tied to their access to forests or their capacity to derive benefits from ecosystem services.

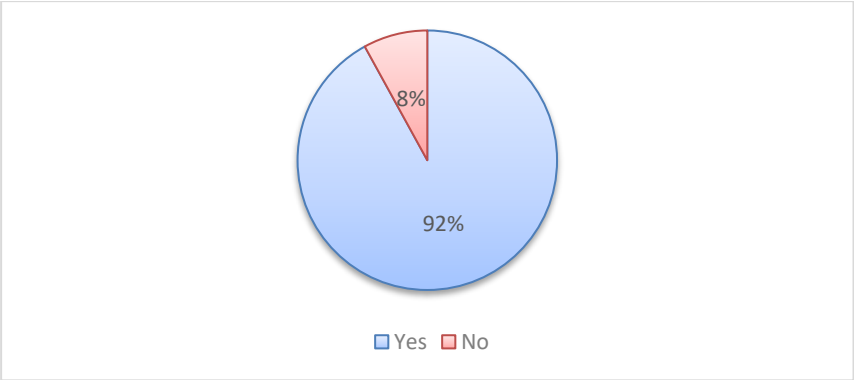

Figure 4.2: Mau Forest access by respondents

Source; Field Data (2022)

4.4.1.1 Firewood

We sought to find out how many of the participants collected firewood from Mau Forest. Among the 125 respondents surveyed, 94% reported utilizing fuelwood sourced from the forest for cooking, while the remaining 6% stated that they did not rely on firewood from the forest, as depicted in Figure 4.3. This finding correlates with the number of Ogiek that access the forest for its products and services. The majority of the Ogiek community members use firewood as their main source of fuel (Miller et al., 2021).

The results demonstrate that the Ogiek community is entirely dependent on the forest for their firewood. Those who do not use firewood from the forest indicated that they use other sources of cooking for example kerosene cooking stoves, and “Jikos.” our results correspond with Senganimalunje et al., (2015) who found out that the primary source of livelihood for the local community involved the collection of firewood, primarily used for cooking and heating.

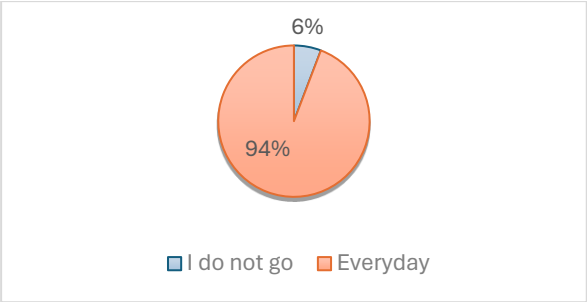

Figure 4.3: Forest Access for Firewood
Source; Field Data (2022)

4.4.1.2 Tree Seedlings

Moreover, we sought to find out if the participants collected free tree seedlings from the forest for growing at their homesteads and farms. Out of 125 participants, 65.6% of the respondents access the forest for tree seedlings that they plant in their homesteads and farms while 34.4% of the respondents do not get tree seedlings from the forest as shown in Figure 4.4. This analysis shows the efforts the Ogiek community members are putting into contributing to environmental conservation through tree planting. Furthermore, this leads to the assumption that the Ogiek community is knowledgeable about the various tree species that can be cultivated within the homestead, closer to their houses, and those that should be grown on their farms.

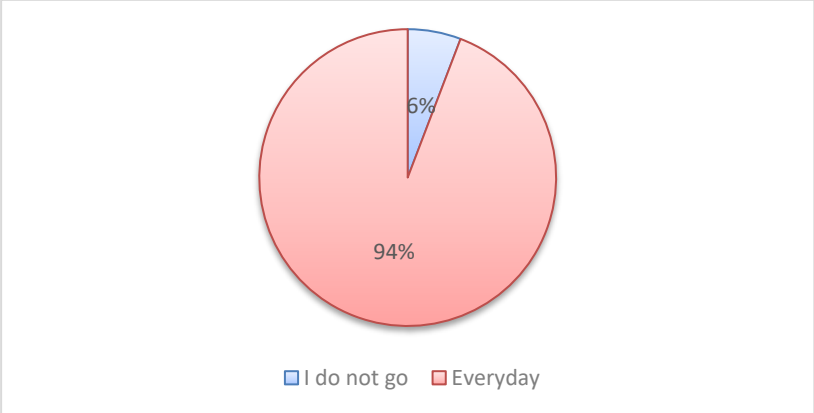

Figure 4.4: Tree Seedlings Access from Mau Forest
Source; Field Data (2022)

4.4.1.3 Honey

The study assessed if the participants accessed honey from the forest. Out of the 125 participants, 87.2% of the respondent's access honey from the Mau Forest while 12.8% of the respondents do not get honey from the forest as indicated in Figure 4.5. The findings confirm the fact that Ogiek community members were originally hunters and gatherers and despite the changing lifestyle and livelihood activities, Ogiek still conduct beekeeping and honey harvesting, from the forest (Dave et al., 2017; Ingram et al., 2017).

As evidenced by the results, there exists an association between identity and wealth through Ogiek's beehives and beekeeping. More hives translate to a high amount of honey and thus increased income through trade with the neighbouring communities. The honey is also used as food, an ingredient in beer brewing. Moreover, there exists a heavy reliance on forest resources for beekeeping through the preparation of beehives and harvesting of honey. Most of the materials needed come from the forest for example tree trunks, barks, and leaves.

Ogiek still practices traditional beekeeping by placing beehives made from hollow logs in trees. The men in the society place the beehives high on trees. Through community leadership, the Ogiek households have been allocated sites for beekeeping. These allocations are respected by all Ogiek households. Forest beekeeping relies on indigenous trees because of the suitability of the trees.

Amongst the 12.8% of the community members who do not access the forest for honey, are those who received training from the government on modern beekeeping techniques and given modern beehives. They thus practice beekeeping at their homesteads.

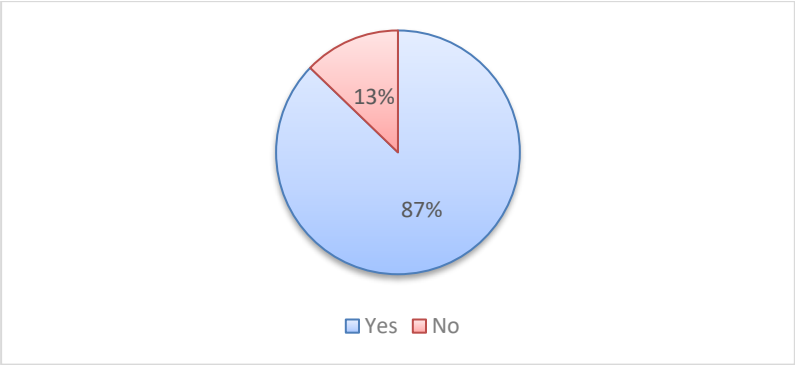

Figure 4.5: Honey Access from the Forest
Source; Field Data (2022)

One respondent from the community said gave his views on the bee keeping practice. He said:

> *"(...) Well, Ogiek and honey cannot be separated this is because beekeeping has been preserved through generations. Other traditions that we used to conduct for example hunting is getting lost. I had hoped that my children would follow all our traditions but no. The world has changed, right? I am however happy my children can keep bees. I have ten beehives in the forest, and that makes me incredibly happy (...)" (Ogiek community member)*

4.4.1.4 Charcoal

The study further sought to establish if the participants utilized charcoal from the forest. One hundred percent of the respondents said that they do not use charcoal as a source of fuel. They indicated that this was because of the existing enforcement of the charcoal production ban by the Kenyan government as a commitment to conserve Mau Forest. These findings were however contradictory to the observation made during data collection. At the market centres, charcoal was visibly being sold by the local community. None of the respondents was willing to provide information on the source of the charcoal because it was a sensitive matter and could "put them in trouble" with the local government if it were leaked out.

However, this finding correlates with the number of people that use firewood from the forest as a source of fuel which showed that 8% of the participants did not utilize firewood from the forest. This however raises the question, where does the charcoal come from? If indeed the

charcoal comes from Mau Forest, how can the local community be engaged to ensure sustainable charcoal production? We recommend further studying the questions mentioned above since our study was not able to ascertain the source of the charcoal.

4.4.1.5 Grass for Thatching Houses

Traditionally, Ogiek lives in thatched houses. The study asses if the respondents collect grass from the forest for thatching their houses. Out of 125, 62.4% of the respondents use grass from the forest for thatching their house roofs while 37.6% of the respondents do not use grass for thatching houses as indicated in Table 4.4. The findings indicate that most of the Ogiek community members depend on the forest for construction materials (Mamo et al., 2007; Senganimalunje et al., 2016; Kabubo-Mariara, 2013).

The Ogiek house known as *kog* is constructed using structures from tree barks and roofed using bamboo tree covers referred to as *teleg*, and the finishing is done by placing thatching grass on top. The responses correlated with the number of people who access the forest for their daily livelihood and the level of education. Those who have received an education and have financial capability use modern materials such as iron sheets for roofing their houses.

Table 4.4: Access to Grass for Thatching

	Frequency *(f)*	**Percentage (%)**
Yes	78	62.4
No	47	37.6
Total	125	100

Source: Field Data (2022)

4.4.1.6 Medicinal Herbs

Out of 125 people interviewed, 21.6% of the respondents did not use medicinal herbs from the forest while 78.4% of the respondents acknowledged to using medicinal herbs from the forest as indicated in Figure 4.6. These results correspond with the fact that Ogiek possesses Indigenous knowledge regarding medicinal plants. For many decades

medicinal plants have been their main source of medicine for illness treatment (Kiragu 2006). However, crucial medicinal plant resources are getting lost (partly due to lack of documentation) as the Ogiek experience rapid change in their traditional lifestyle (Ngari et al.2010). Furthermore, these findings correlate with the number of people that access the forest and it is an indication that the Ogiek community still practices their traditional lifestyle and depends on the forest for medicine for personal use and economic purposes through trading in neighbouring communities. The findings also correlate with the number of people that have attained basic education and they could be getting their medicine from the hospitals.

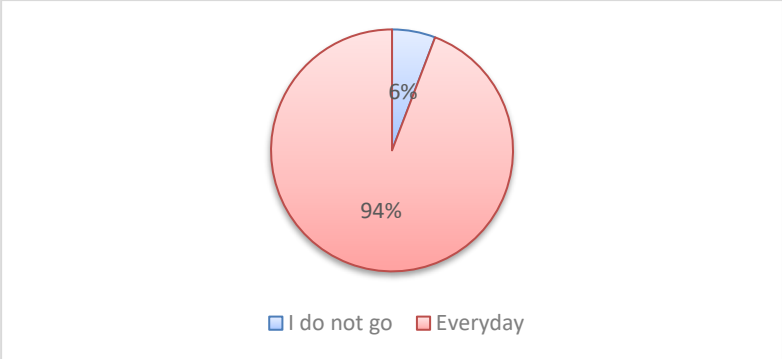

Figure 4.6: Access to Medicinal Plants
Source: Field Data (2022)

4.4.1.7 Wild Game Meat

Out of 125 participants,70.4% of the respondents admitted to consuming wild meat from the forest while 29.6% of the respondents were not consuming wild meat gathered from the forest as shown in Figure 4.7. The findings are in line with other research indicating that hunting has been part of Ogiek's economic livelihood. Ogiek cares for wild animals and practices sustainable hunting of primarily species with substantial populations. (Rambaldi et al.2007). This hunting lifestyle has however been changed by land resettlements and forest evictions.

These finding also compares to the number of people that access their forest for their daily livelihood. Moreover, it shows that most of

the Ogiek community members still hold on to their traditional practice where their food consists of wild game meat. Furthermore, modernisation and the changing lifestyle could have altered a few of the Ogiek community member's eating habits.

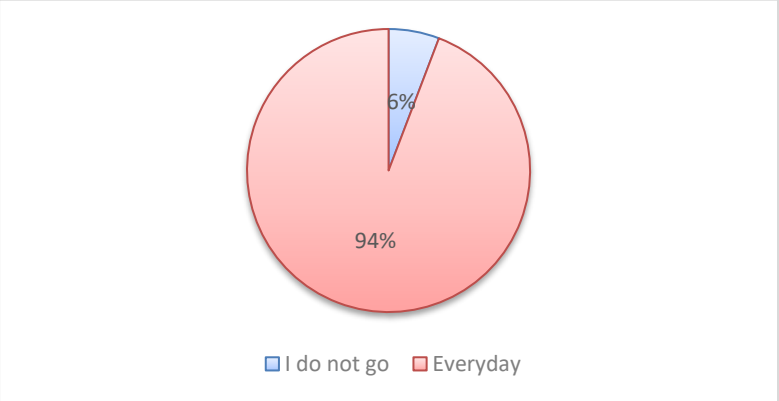

Figure 4.7: Access to Wild Game Meat
Source: Field Data (2022)

4.4.1.8 Timber Wood

The study found that out of 125 participants,86.4% of respondents stated that they were using timber wood for the construction of their houses from the forest while 13.6% of the respondents were not using timber wood from the forest as indicated in Figure 4.8.

The result reflects the difference in the economic status of the Ogiek community. Poorer households are characterized by their restricted livelihood choices and are increasingly reliant on forest products for example wood than their wealthier counterparts (Senganimalunje et al., 2016). Furthermore, the enforcement put across by the government on restrictions from forest access for wood and timber could account for the 13.6% of Ogiek community members that do not access timber from the forest for the construction of their houses.

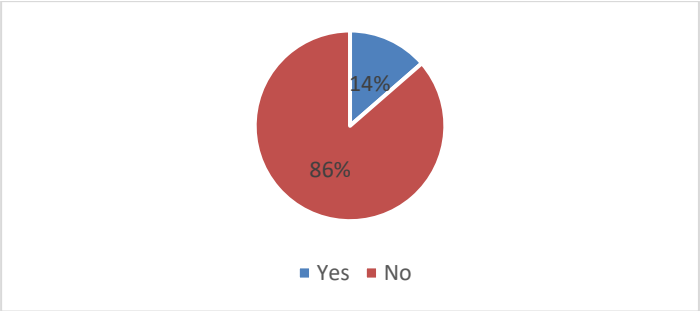

Figure 4.8: Access to the Forest for Timber wood
Source; Field Data (2022)

4.4.1.9 Wild Fruit

The forest is a source of food for local communities that are dependent on it. This is reflected in our results, out of 125 participants, 24% of respondents said that they do not consume wild fruit from the forest while 76% of the respondents admitted to eating wild fruits from the forest as a source of food as shown in Figure 4.9. This finding compares to the number of people who access the forest for their daily livelihood from the forest. Moreover, it indicates that the Ogiek community, members remain dependent on the forest for wild fruits as a source of food. Our results align with multiple authors, such as Shackleton et al. (2002), Ickowitz et al. (2015); Pingali (2015); and Rasmussen et al. (2017), who highlight the significance of wild fruits to local communities.

Yet, 24% of the Ogiek community does not engage in forest access for wild fruits. This might be attributed to recent government initiatives promoting new agricultural techniques, including fruit cultivation. Alternatively, they may acquire fruits from other communities that have migrated to Mau Forest or purchase them from the local market.

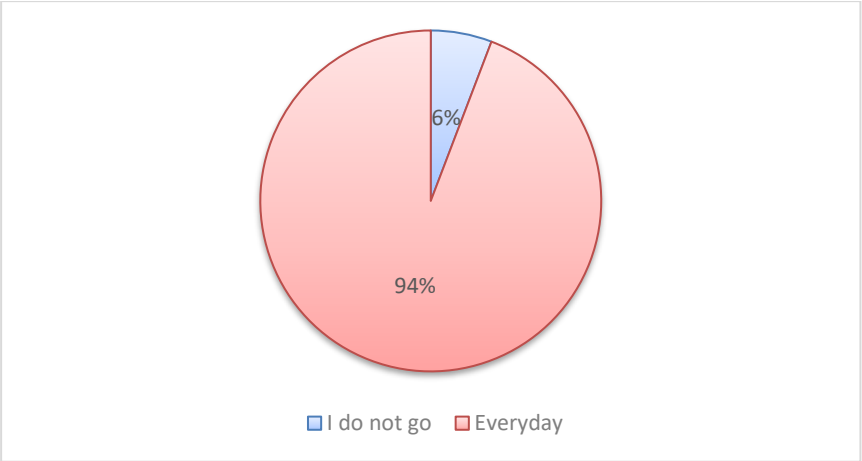

Figure 4.9: Forest Access Wild Fruits
Source; Field Data (2022)

Comparatively, there are diverse levels of need for forest products in the Ogiek community. Firewood is the most accessed at 92% followed by honey at 87.2%, timber wood at 86.4%, medicinal herbs at 78.4%, wild fruits at 76%, wild meat at 70.4%, tree seedlings at 65.6%, grass for thatching at 62.4% and charcoal at 0% as shown in Figure 4.10. This is a strong indication that the Ogiek community entirely depends on the forest to meet their daily livelihood. The higher percentages displaced in the access to forest resources indicate that the majority of Ogiek's households have a lower economic status and thus depend on the forest for the provision of their livelihood.

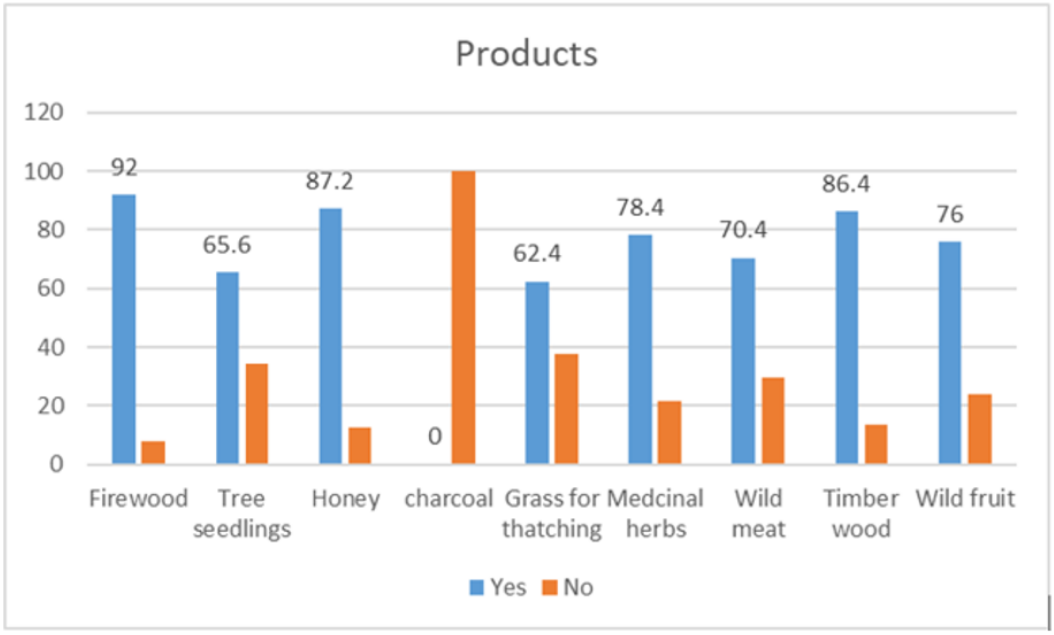

Figure 4.10: Comparison Between Forest Products Access Levels
Source: Field Data (2022)

4.4.2 Forest Access Frequency

Of the total respondents,52% of the respondents go to the forest every day while 3.2% of the respondents do not go to the forest. 6.4% visit the forest monthly, while 38.4% go to the forest on a weekly basis, as shown in Table 4.5. These findings correlate with the number of people that go to the forest and the resources that are collected from the forest, and it is indicative of the complete dependence of the majority of Ogiek community members on the forest products for the provisioning of their everyday livelihood needs.

The lower number of households that do not go into the forest represents the small percentage of the community that has attained a higher level of education, and they could have diversified their livelihoods and economic activities that they engage in.

Table 4.5: Frequency of Participants Forest Access

Time Frame	Frequency *(f)*	Percentage (%)
I do not go	4	3.2
Everyday	65	52
Once a week	48	38.4
Once a month	8	6.4
Total	125	100

Source: Field Data (2022)

4.4.3 Main Occupation of Ogiek community

Out of 125 participants, 87.2% of the respondents practice farming while 9.6% practice a mixture of activities, and 3.2% practice trading as shown in Figure 4.11. The higher number of Ogiek communities practicing subsistence farming could be because of the restricted access to the forest, which has led to livelihood disruption, and they are forced to adopt a new lifestyle from their traditional hunting and gathering. Farming is majorly practiced inside the forest through a government program called PELIS-Plantation Establishment for Livelihoods system that allows farmers to grow crops in a young tree plantation (Agevi et al., 2016).

A smaller percentage of the community has adopted a mixture of activities for example keeping animals and growing crops and others engage themselves in trading. This could be because of an influence from migrant communities for example the kikuyus who have settled in Mau Forest.

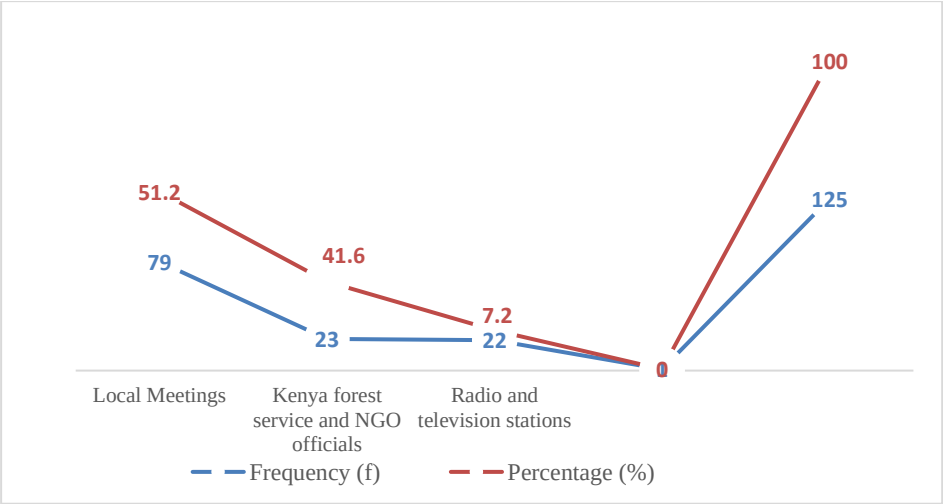

Figure 4.11 Occupation of Ogiek Community
Source; Field Data (2022)

4.4.4 Limitations Towards Ogiek Community's Livelihood

The study found that out of 125 participants, 52.8% of the respondents stated that their livelihood had been limited through restriction to access of forest resources by the government while 27.2% of the respondents' mentioned evictions from their homes by the government as the main limitation to their livelihood. 13.6% of the respondents said all the above restrictions from forest access, eviction from their homes, and reduction of the forest cover through deforestation and forest degradation harmed their livelihood.6.4% said that their livelihood had been affected by the reduction of the forest cover as shown in Table 4.6. The high number of people who have been negatively affected by the restriction of forest access by the government correlates with the higher number of daily visits to the forest. These results show the high forest dependence amongst the Ogiek community.

Our findings agree with other research about the enduring debate on whether conservation interventions, such as protected areas, contribute to or perpetuate poverty traps. This dilemma arises from concerns about restricting forest product use, displacing communities and livelihoods, and the neglect of managing ecosystem disservices. Alternatively, it questions whether these interventions provide

avenues to enhance the livelihoods of rural populations (Rasmussen et al., 2017).

Table 4.6: Sources of Limitations to Ogiek's Livelihood

Limitation	Frequency *(f)*	Percentage (%)
Restrictions of forest resources by the government	66	52.8
Eviction from your homes by the government	34	27.2
Reduction is size of forest cover	8	6.4
All of the Above	17	13.6
Total	125	100

Source: Field Data (2022)

4.4.5 Challenges and Divergences in Forest Livelihoods and Conservation

Regarding conflicts between the government and Ogiek community,69% of the respondents said that there exist serious conflicts between the government and the Ogiek community members and these conflicts interfere with their forest resource access and use, 27.8% of respondents indicated that conflicts between the state and the community are not significant and seldom disrupt forest utilization. 2.4 % of the respondents did not have any idea if the conflicts occur and if they have any impacts on forest resource use, as shown in Table 4.7. These results indicate that there exists conflict at different levels as viewed by the respondents. The difference in the conflict intensity could be based on individual experiences of the existing conflicts and how they impacted their access and use of the forest resources. The surprising response was from those who indicated that they did not have any idea if conflict existed and if it impacted forest access and use.

There exist conflicts between the Ogiek and neighbouring communities. This is exemplified by the fact that 70.6% of respondents reported serious conflicts with neighbouring communities, yet they do not impede forest management or utilization. 23% of respondents reported no significant conflicts with neighbouring communities, which consequently do not disrupt forest utilization. While 5.6 % of the respondents did not have any idea. A high number of the respondents

who indicated that there existed conflicts with the neighbouring communities referred to the migrant communities that migrated into Mau Forest due to political and other reasons. The respondents unanimously indicated that they wanted the migrant community out of the Mau Forest.

Indefinite conflict persistence has been experienced in the research area.50% of the respondents said conflicts over forest resources tended to persist indefinitely, 11.1% indicated that conflicts are typically resolved promptly and effectively while 37.3% of the respondents said some conflicts tend to get resolved while some persist indefinitely. These results were substantiated by the key informant interviews where the respondents indicated that there existed major cases that had been taken to court due to conflicts resulting from land tenure clarity, but these cases have not been resolved after many years. Members of the Ogiek community communicate lower-level conflicts to the local area chief, and several such instances have been successfully resolved. The respondents indicated that that there exist intercommunal conflicts and such are resolved through a group of elders.

Participant responses indicated a preference within the community for formal methods of conflict resolution. 57.1% of the respondents preferred formal ways of solving court cases through the courts, while 37.3% preferred informal ways of solving the cases and 4.8% had no idea. The preference of courts overseeing the conflicts is because of the lack of trust between the community members and the village elders that oversaw the informal conflict resolution process. The respondents highlighted that the local leadership was susceptible to corruption and influence, resulting in biased judgments and unfair outcomes These results have been summarised in Table 4.7 below. All the responses in the table were out of 125 participants.

Table 4.7 Existence of Conflict, Resolution Process, and its Impact on Forest Resource Use and Management

State of Conflict	Responses
Conflicts between the state and the community are not serious and rarely interfere with forest use	35
No idea	3
Serious conflicts interfere with their forest resource access and use	87
Conflict between Ogiek and neighbouring communities	
There are serious conflicts with the neighbouring communities, but they do not interfere with forest management or use,	89
There are no serious conflicts between the neighbouring communities	29
I have no idea	7
Conflict Persistence	
Conflicts tend to persist indefinitely	63
Conflicts tend to be resolved indefinitely	14
Some conflicts are resolved efficiently while others persist	47
I have no idea	1
Preference on conflict resolution	
Both formal and informal	47
Formal ways e.g., courts are used	72
I have no idea	6

Source: Field Data (2022)

4.4.6 Respondent's Recommendation on Conflict Resolution

Simultaneously, the respondents proposed that the best way to end the conflict and bring peace to the communities in Mau Forest is to evict all the immigrant communities from Mau Forest. Furthermore, they indicated that they had coexisted peacefully before the migrant arrival. Moreover, they requested for the courts to conclude their pending cases because the outcome shall determine how they shall use forest resources.

Concerning the compromised village elders, the community must convene a meeting to conduct elections for new leaders, with the expectation that the corrupt individuals step aside from their roles. This should be a process that fully engages all members of the community in decision-making and amendment the current local rules and regulations. Finally, the community should elect a conflict mitigation team to effectively address the diverse conflicts that may arise within their midst.

4.5 Sustainability of Mau Forest Resources for Dependent Ogiek Communities

4.5.1 Link Between Forest Cover Decrease and Community's Daily Actions

The results indicate that 8% of the respondents did not have an idea if their activities had contributed to decreased forest cover,52% of the respondents did not agree that their activities may have contributed to the reduction of the forest size while 40% of the respondents agreed that their daily actions have contributed to the decrease of the forest, as shown in figure 4.12. This finding correlates to further information that the community provided regarding receiving training on sustainable agriculture by the Ewaso Nyiro Development Agency. The training and implementation focused on agroforestry and the growing of nitrogen-fixing plant trees. This program is part of the Plantation Establishment and Livelihood Improvement Scheme.

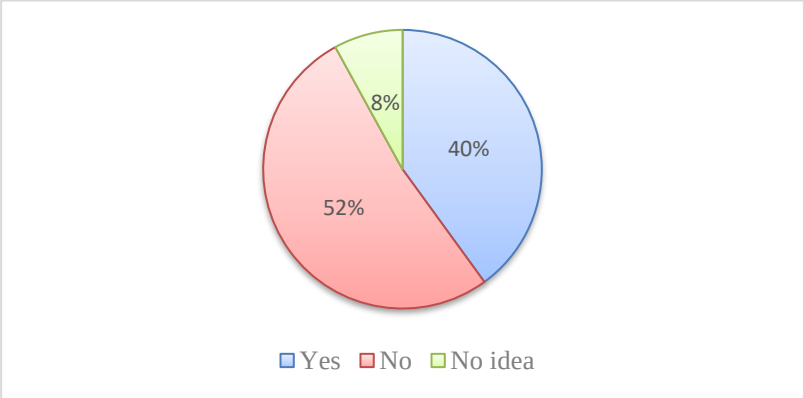

Figure 4.22 Ogiek's Contribution to Forest Destruction
Source; Field Data (2022)

4.5.2 Access and Source to Reliable Forest Conservation Information

The study found that 51.2% of the respondents were not able to access reliable forest conservation information, 41.6% were able to access forest conservation information and 7.2 of the respondents did not have an idea, as shown in Figure 4.13. The high number of people who do not have reliable forest conservation information correlates with the majority of the Ogiek community members who stated that their

daily actions did not have any negative impact on the forest cover. Our results are in line with Azeez, (2008), who argues that insufficient dissemination of environmental conservation information to local communities reliant on forests for their sustenance is a significant contributor to the elevated deforestation rates across the African continent.

These findings were further substantiated by the KFS officials who stated that the department relied on donor funding to formulate programs that create awareness on conservation measures. The department did not have sufficient funds to implement extensive programs.

In addition, the study found that 60% of the respondent's access information about conservation from local meetings, 20.8%. of the respondents indicated that their main source of information on forest conservation was from KFS. 17.6% of respondents got forest conservation information from Radio and television was second, while 0.8% from social media, as indicated in Figure 4.14. These findings bring out the importance of local gatherings in passing information. These meetings have been a mode of communication amongst the Ogiek community for a long time. Typically, there is a strong turnout at these meetings, and the community values and responds to the information shared during these gatherings.

In this context, we can view these gatherings as a form of social capital contributing to social relationships. These connections can be leveraged to facilitate information flow and collective action (McDougall & Banjade 2015). This proves significant for adaptive collaborative approaches including initiatives like community-based natural resource management (Bodin 2008) vital for conservation efforts.

Moreover, the participants also relied on information from KFS but on the other hand, KFS officials mentioned its limitation in funding capacity-building programs. This correlates with the number of people

who believe that their daily actions do not lead to forest destruction. Moreover, these findings also correlate with the higher number of people who have a low level of education and might limit their ability to access forest conservation information from other available sources for example non-governmental or other relevant government departments. The lifestyle change is reflected in the number of people who get their conservation information from radio and social media.

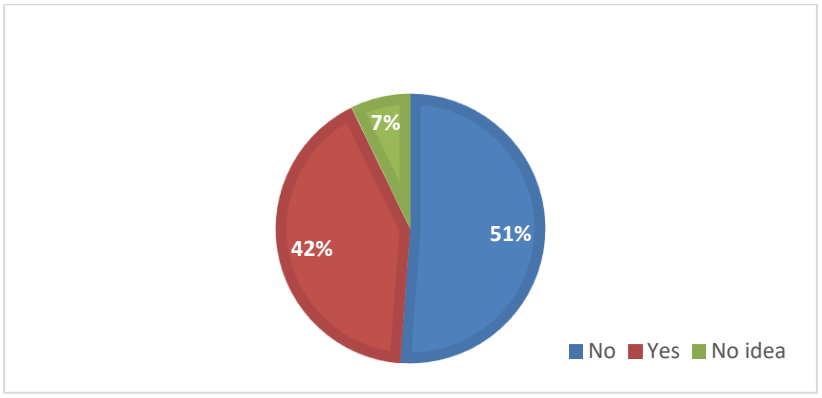

Figure 4.13: Frequency to Access Reliable Forest Conservation Information
Source: Field Data (2022)

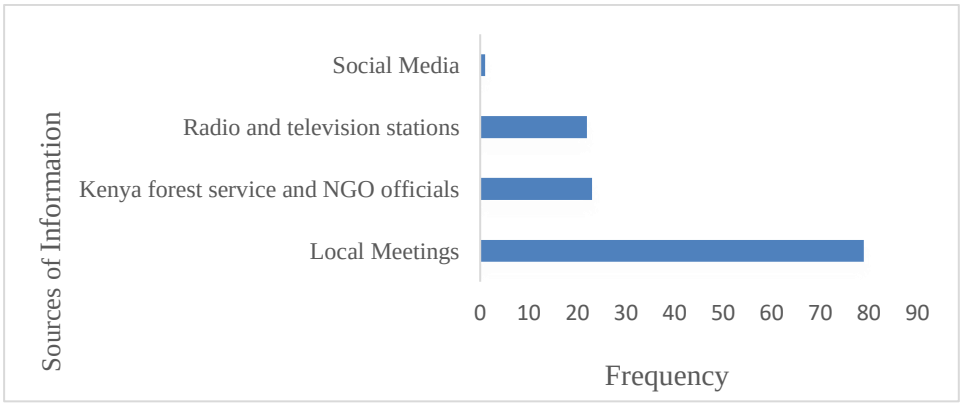

Figure 4.14 Sources of Information
Source: Field Data (2022)

4.5.3 Sustainable Forest Conservation Knowledge

Findings from the research indicated that among the 125 participants,48.8% of the respondents had never heard about the concept of sustainable forest management.15.2% of the respondents had no idea about sustainable forest management while 36% of the respondents had heard about it as shown in Figure

4.21. These results correspond to the higher number of participants that were not able to access reliable information on forest conservation. Furthermore, there is correlation with information from KFS about insufficient funding for programmes on capacity building of the community in Mau Forest of sustainable forest conservation and other related topics. The lack of adequate knowledge on sustainable forest conservation could be the cause of the continuous degradation of Mau Forest.

Our results align with several studies which argue that empowering local communities to determine their affairs, particularly in the context of conservation, is fundamentally a moral rights matter (Carson et al., 2018). While there is international consensus on the significance of involving indigenous groups in forest management, such as through capacity development, the implementation of these practices varies in terms of effectiveness, interpretation, scope, and decision-making processes (Sterling et al. 2017).Consequently, there is a noticeable decline in the capability for local communities to participate in sustainable forest management policies, leading to instances where they are marginalized, dismissed, and overlooked (Awuh, 2016). This is apparent in our case study involving the Ogiek community in conservation measures.

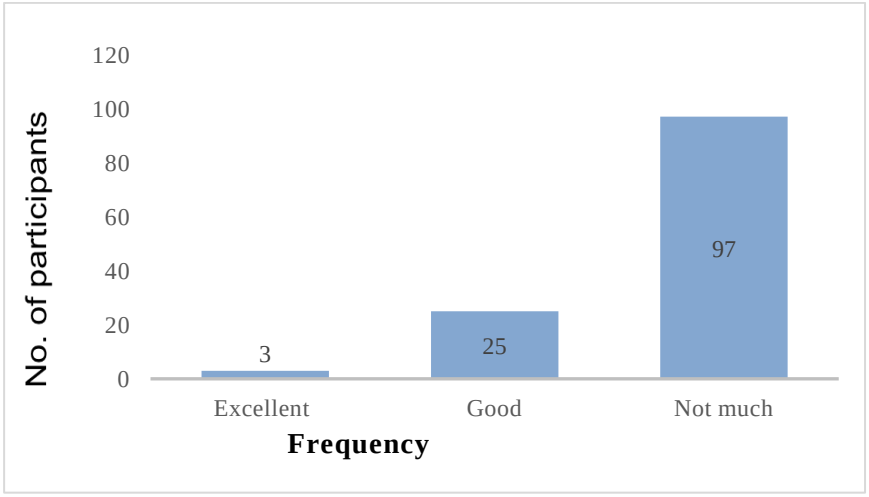

Figure 4.15 Sustainable Forest Conservation Knowledge
Source: Field Data (2022)

4.5.4 Management of Community Forests for the Protection of Forest Resources

Even though community members have limited access to conservation information, 73.6% agreed that community participation in managing forest resources will safeguard the forest resources.12% of the respondents had no idea while 14.4% of the respondents did not agree with this statement as shown in figure 4.16. The high number of community participation in forest conservation correlates with the high number of Ogiek community members that access the forest for resources. Due to their dependence on the forest, they are willing to be part of sustainably conserving the Mau Forest. In this sense, their daily livelihood will be restored.

These findings could be because, in the wake of substantial failures in centralized systems, numerous developing countries have explored various models of decentralized forest governance (Lund et al., 2018). However, research indicates that participation of local communities in conservation remains low across developing nations (Mbeche et al., 2021). This is evident in the Ogiek community (Chomba et al., 2015) despite their willingness to participate in conservation measures. Furthermore, Ogiek are eager to take part in conservation as they are a source of local indigenous knowledge that can influence forest conservation and its sustainability (Brugnach et al. 2017).

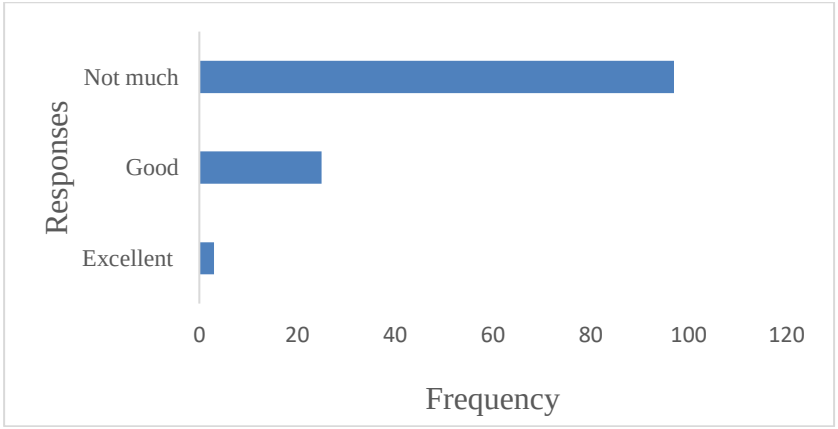

Figure 4.16 Community Participation in Forest Conservation
Source: Field Data (2022)

4.5.5 Ogiek's Involvement in Mau Forest Conservation in the Last Decade

The study established that out of 125 participants,77.6% of the respondents stated that they had not had much involvement in the conservation of Mau Forest. 20% said that their involvement was good and 2.4 % indicated that their involvement was excellent, as shown in Figure 4.17. These findings relate to the higher number of respondents who said they do not get information on forest conservation. Additionally, there is correspondence with the higher number of Ogiek community who want to be involved in forest conservation. There was a general feeling among the respondents of exclusion from the conservation process of the Mau Forest (Mbeche et al., 2021).

Our findings are consistent with those of Waruingi et al. (2021) and Kwayu et al., (2014), who examined the extent and factors influencing household participation in Payment for Ecosystem Services (PES) programs in Kenya. They concluded that the involvement of local people is insignificant. Furthermore, our study agrees with recent calls to enhance indigenous participation in forest management, equitable engagement of stakeholders, and recognition of community priorities (van Kerkhoff & Pilbeam 2017). Furthermore, we argue that households should voluntarily participate in conservation programs (Jones et al., 2020). However, the voluntary principle is not enforced by some conservation schemes (Mullan and Kontoleon, 2012), and administrative selection can influence who is involved and who is not.

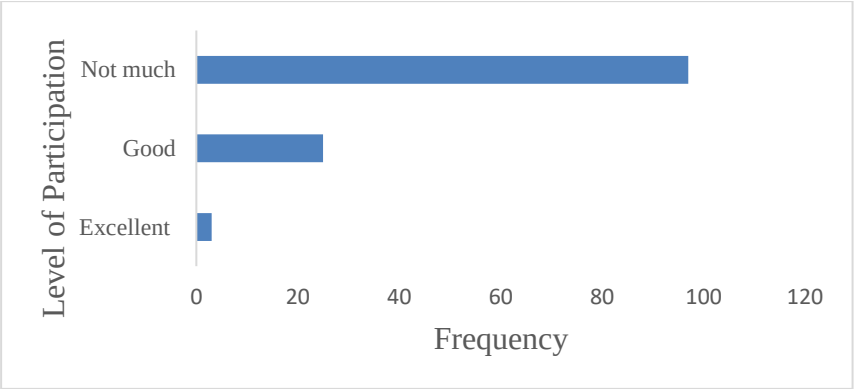

Figure 4.17 Extend of Participation in Conservation Programs in the Last Decade
Source: Field Data (2022)

4.5.6 Sensitizations on Sustainable Forest Management

Out of 125 participants,32% of the respondents said that they had never had an opportunity to be sensitized about sustainable forest management by KFS officers or NGOs, while 11.2% of the respondents said KFS officers sensitized them yearly. Moreover,14.4% of the respondents said they received information about sustainable forest management from KFS every quarter while 28.8% said they received sustainable forest management information every 6 months. These findings relate to the high number of respondents who indicated that they would like to be involved in sustainable forest conservation. Additionally, insufficient funding from KFS programs could also have led to limited numbers and frequency of times that the respondents were sanitised by KFS and NGOs. Furthermore, these findings relate to the high number of respondents who thought that their daily actions do not lead to deforestation and forest degradation.

4.5.7 Interactions Between Ogiek Community, KFS and NGOs

Out of 125 participants,45.6% of the respondents said that the interaction takes the form of local barazas which most of the time are coordinated by the area chief with support from the national government.49.6% had no idea of the form the interactions take.4% of the respondents said the interaction takes the form of workshops while

0.8% of the respondents said it takes the form of pilot projects as indicated in figure 4.18.

The high number of respondents who indicated that they did not have an idea of which forms the interactions take place could be because of a lack of sufficient information flow. Alternatively, it could also be due to mistrust between the respondents and meeting organisers stemming from the overall sentiment among respondents that they were excluded from decision-making processes regarding Mau Forest conservation. The respondent's eviction from their homes inside the forest could also be a reason why the respondents did not find it important to find out how the interactions between KFS and NGOs regarding sustainable forest management took place.

These results however relate with participants indicating that they received information on forest conservation through local gatherings. These results show the importance of local social gatherings concerning relaying information, especially regarding forest conservation (McDougall & Banjade 2015)

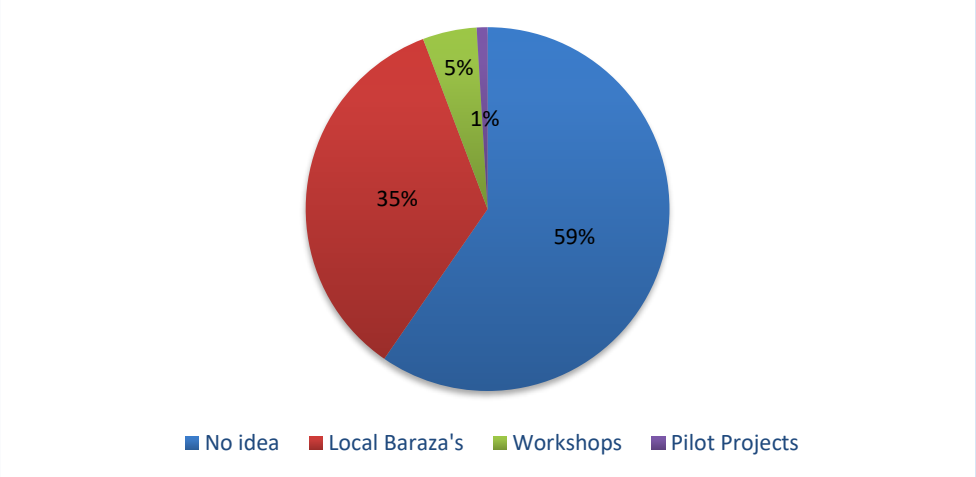

Figure 4.18 Interaction Medium Between Ogiek, KFS and NGOs
Source: Field Data (2022)

4.5.8 Household Participation in Conservation Programmes

The results establish that, out of 125 participants,86.5% of the respondent's household members participated in the conservation activities between 0-3 times .11.1% of the respondent's household

members participated in the activities between 4-7 times and 2.4% had participated over 7 times as shown in Figure 4.19. These findings demonstrate an exceptionally low participation level of the Ogiek community households in sustainable forest conservation activities.

The low participation levels might be because of the low levels of knowledge on sustainable forest management amongst the respondents. Our findings align with Melnykovych et al., (2018) who concluded that, to encourage the involvement of local communities in forest conservation, it is essential to enhance their capacity through the exchange of knowledge and environmental education. Furthermore, following Carson et al. (2018), the involvement of the Ogiek in forest policy has been constrained by a lack of knowledge or comprehension of Ogiek's local livelihoods among decision-makers, discriminatory cultural practices, and an intricate social history.

Furthermore, all participants reported that they had not participated in the formulation of projects; their involvement had been limited to project implementation and monitoring. It was further observed during data collection that a substantial number of the ongoing projects were less than a decade old. The lack of involvement of the respondents in project formulation could be the reason for the low participation of the respondents and their household members in the conservation activities.

There is lack of individual or communal ownership of the projects under implementation. This was evident during the household survey as one of the participants indicated:

> *(…) I was only involved in the tree the tree planting exercise last year. This project and the trees planted belong to KFS" (…), (Community member (Community member)*

Lack of project ownership by the local communities can lead to unsustainability of conservation measures. Besides, the basic levels of education of the respondents could be an assumption used by the project proponents on not involving the community in the project formulation process. Supported by Soe & Yeo-Chang (2019), we further argue that the pivotal factor in their decision to participate in

forest conservation is the assurance of receiving benefits associated with their involvement.

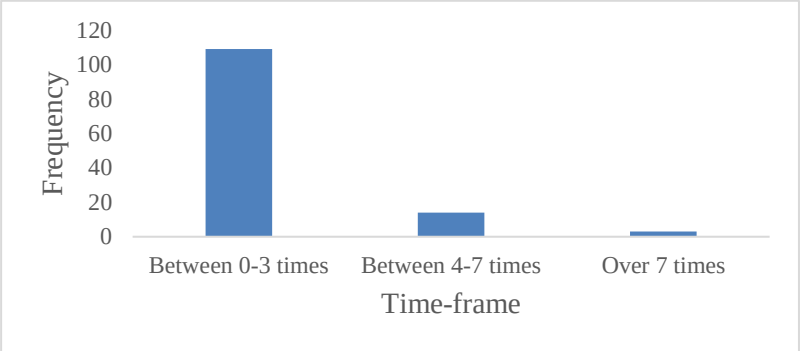

Figure 4.19 Timeframe of Household Participation in Conservation Projects
Source: Field Data (2022)

4.5.9 Household's Community Forest Association (CFA)Membership

This study noted that 75.4% of the respondents said that none of their household members belongs to a CFA .4.8% had no idea of the existence of the CFA while 18.3% of the respondents agreed that members of their household belong to a CFA as shown in figure 4.20. The high amount of non-involvement and lack of information on the existence of CFAs correlates with the high number of household members who do not engage in forest conservation activities. This could be because of a low level of education and thus lack of confidence in engaging in CFA activities. Alternatively, it could be because of a lack of adequate information for sustainable forest management. There is however a small number of households that engage themselves in CFA, they could belong to those that have attained a higher level of education and understand forest conservation and thus actively engage in CFAs. Moreover, KFS has a limited budget and engages with fewer households in conservation programs contributing to lower household members participating in the program.

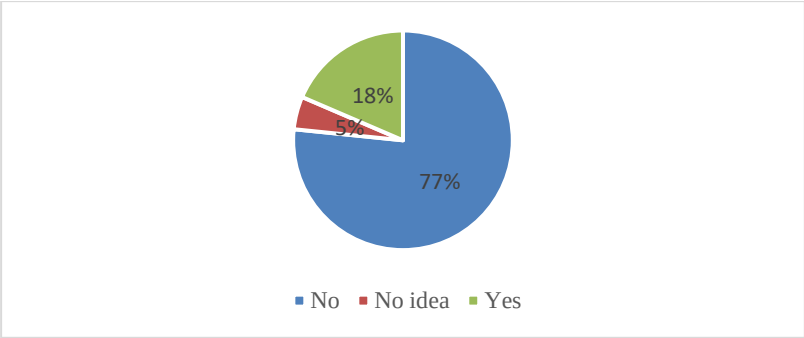

Figure 4.21 Household Involvement in CFA Implementation
Source: Field Data (2022)

4.5.10 Recommendations by Respondents on Sustainable Forest Conservation

From the survey, the respondents gave several suggestions on the government's action towards the sustainable conservation of Mau Forest. First, the government ought to consider undertaking reforestation programs using indigenous tree species. The respondents argued that due to their many years of interaction with the forest, they have attained knowledge of the indigenous tree species that could be planted. They expressed willingness to collaborate with the government in providing indigenous information on tree growing. The preference was given to indigenous trees because of their resilience to the changing climate. Moreover, they argued that the exotic tree species have encouraged the timber trade which has led to illegal logging in the forest.

Secondly, the government ought to consider incorporating indigenous knowledge into sustainable forest conservation efforts. The respondents further emphasized the government's consideration in fully involving all the community members in the forest conservation activities, "the government should not be selective when choosing the participants", remarked one participant. This point was raised because currently, Kenya Forestry Service only involves the youth in its conservation programs.

4.6 Collaboration Challenges for Ogiek Communities

*4.6.*1 *Involvement of Household Members in Collaborations*

From the study findings, out of 125 participants,23% of the respondents said there was no collaboration between the local community and the other stakeholders while 77% agreed that there existed collaborations between CFAs, KFS, and NGOs. These results relate to key informant interviews conducted with the KFS; they confirmed their department has been partnering with the Ogiek community through the Ogiek Peoples Development program to reclaim the Mau Forest. The program entails reforestation and awareness creation on land rights. KFS has also worked with the Ewaso Nyiro Development Authority to implement the Plantation Establishment and Livelihood Improvement Scheme (PELIS).

Through CFAs, Ogiek community members are allowed the right to grow crops entailing their staple foods and satisfying the farmer's search for cropland. Cultivation is during the preliminary stages of forest planting or re-establishment in the forest's degraded areas. The goal of the program is to benefit the most vulnerable groups aiming at boosting forest preservation efforts and enhancing food security for the Ogiek community members. Moreover, it focuses on increased incomes and consequently generates proceeds to the Treasury from the land rent of the plots.

Furthermore, at an individual and household level,60% of the members of the community have not been involved in the collaborations even though they know about them.38% of the respondents have been involved or know somebody who has been involved in the collaboration while 2% have not been involved in the collaborations as shown in figure 4.21. These findings correlate with the lower number of people who had joined CFAs due to insufficient communication and information on sustainable forest management. Moreover, collaboration efforts in Mau Forest are mostly financially supported by NGOs directly or through KFS. There has been a decline in the support towards these programs and as such very few new CFAs

are being created. The sustainability of the already existing CFAs is problematic due to insufficient funding.

Regarding the perception of the respondents on the success of collaborations,63.5 % had no idea if the collaborations were successful or not, while 29.4% of the respondents said the collaborations were successful and 7.1% of the respondents said the collaborations were not successful as shown in figure 4.22 below. The high number of people without any idea of the success or failure of the collaboration can be associated with the lack of community involvement in any collaboration.

Similarly, the respondents who said the collaborations had failed gave two reasons for their arguments. First, the collaborations only target the elite members of the community and as a result, most of the Ogiek households are excluded because their level of formal education is basic, and some have not attained formal education. Our findings substantiate the conclusions drawn by Waruingi et al. (2021), who similarly concluded that within Mau Forest wealthier households participated more in the PELIS program as compared to poor households because they could afford to pay for registration fees and meet other direct and indirect costs. The poorer households lacked the initial investment costs, lacked information access, and technical capabilities. Therefore, the ability to access forest products and the sharing of PELIS revenues positively influenced participation.

The participants further argued that the projects only targeted the youth who do not take forest conservation seriously and thus do not fully and wholeheartedly engage in its conservation. Finally, they mentioned that they were not involved in the project development and planning phases but only in the implementation. Due to the above-mentioned reasons, the socioeconomic and environmental needs of the community were not met, resulting in a lack of ownership of the projects by the community members and thus project failure.

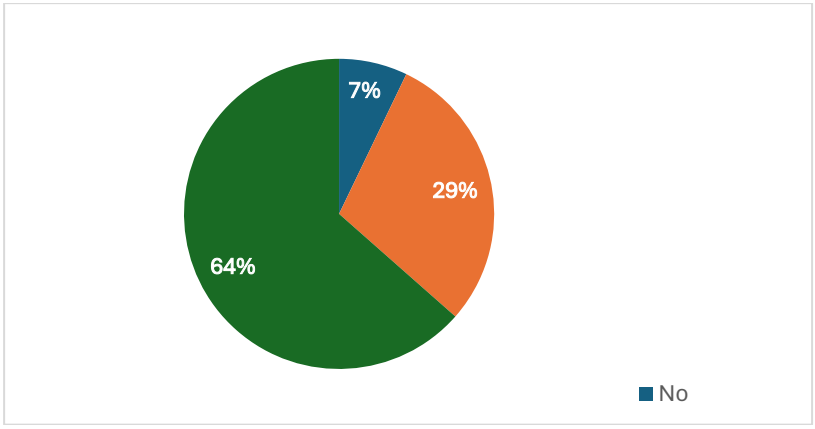

Figure 4.21 Involvement of Household Members in Collaborations
Source: Field Data (2022)

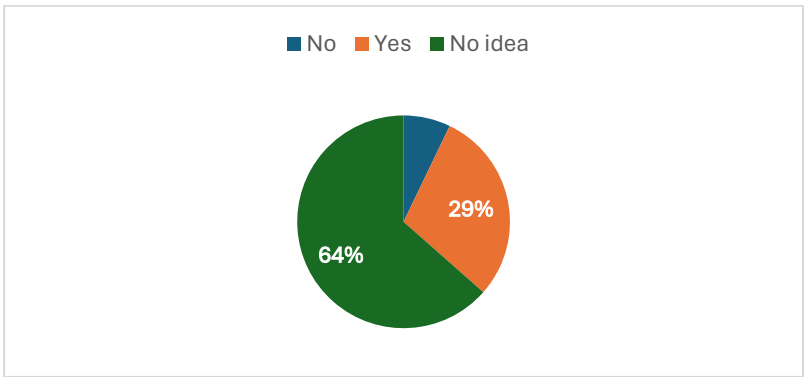

Figure 4.22 Perception of the Failures or Success of Collaborations
Source: Field Data (2022)

4.7 Mandate of KFS in Mau Forest Conservation

4.7.1 Legislation and Institutional Framework Amendments for KFS

KFS department reported that over the past decade, improving forest management has been an important target in forestry sector amendments. In addition, due to devolution, the county governments are obliged to develop spatial plans and forest conservation strategies. The department has therefore put efforts to amend the Kenya Forest Act of 2016 through an act of parliament. The most recent one was in the year 2022. The Forest Conservation and Management (amendment) bill of 2021 seeks to delete clause 34(2) from the 2016 act, which makes it mandatory for authorities to vet anyone trying to alter forest boundaries.

The same clause protects forests from actions that put rare, threatened, or endangered species at risk. This Forest Policy provides a framework for improved forest governance, resource allocation,

partnerships, and collaboration between the National and County governments, the private sector, and non-state actors. It also provides for monitoring and evaluation to enable the sector to contribute to the achievement of the country's growth and poverty alleviation goals within a sustainable environment. The department is also working on the grazing act which examines forest zoning.

4.7.2 Involvement of Ogiek in Sustainable Management and Utilization of Forest Resources

KFS through several initiatives has taken into consideration the needs of the communities. The Forest Act of 2016 provisions for Participatory Forest Management (PFM) to engage forest-dependent local communities with the government in forest management resulting in the creation of Community Forest Associations (CFAs). To reach the world recommendation of 10% KFS had a plan of increasing forest cover by 670,000 hectares in the year 2020, partly through engagement with the CFAs.

Through the national government, the department established the Plantation Establishment and Livelihood Improvement Scheme (PELIS). PELIS allows forest bordering Communities, through Community Forest Associations (CFAs) to grow local staple crops inside the forest. The crop cultivation is during the initial stages of forest plantation establishment or restoration in degraded forested areas. The program's goal is to benefit marginalized forest-dependent community members, such as women and poor community members. Furthermore, the department has also collaborated with the Ewaso Nyiro North Development Authority to provide tree seedlings to the community members. Similarly, to enhance honeybee production, they the local community with modern beehives.

According to the department, Ogiek community members have displayed a cheerful outlook towards the policy development process because they fully depend on the forest for their livelihood and thus ready to be part of the sustainable management and conservation.

Moreover, the planning practices within the KFS have integrated social and economic values of the forest. Acknowledging Ogiek as an Indigenous community, the department permits them to conduct their communal initiation activities within the forest. Throughout this period, they actively safeguard the forest and assist the department by reporting any illicit activities occurring within the forest. Additionally, in collaboration with the department, the Ogiek's cultural festivities are celebrate by engaging in tree planting activities.

To strengthen the economic knowledge of the Ogiek, the department has funded training sessions and allocated resources for livelihood improvement projects. A segment of the Ogiek community underwent training regarding preparation of compost manure, enabling them to utilize organic manure on their farms. Further, the department provided sensitization on economically sustainable and climate-resilient crops, including Irish potatoes, beans, cabbage, and cowpeas. In the same way, a measurable number of community members received modern beehives for beekeeping on their land.

Formerly, Ogiek community utilised honey for domestic purposes and exchange trading. However, currently it accounts for a source of income for families. In collaboration with multiple stakeholders including KFS among others, Mariashoni Community Development Community Based Organization (MACODEV CBO) was established in 2012 by local beekeeper groups and serves as a community-based organization. Its goal is to empower and guide communities focusing on promoting sustainable development and enhancing livelihoods through beekeeping and eco-farming.350 beekeepers organized into twelve self-help groups are part of MACODEV in Mariashoni. Furthermore, MACODEV adds value to the honey through buying from their members, refining, and packaging.

Even though MACODEV exists we noted occurrence of three distinct value chains in the honey-selling process for the non-members. Initially, sales may occur at the local level for a smaller quantity of honey. The harvested honey is subsequently transported to nearby towns and sold to intermediaries, who further convey it to major cities

like Nakuru and Nairobi for resale. Consequently, the prices vary at various levels, with the lowest prices observed at the local level and the highest prices in larger cities. As a result, intermediaries tend to generate higher profits compared to Ogiek farmers.

In addition to the previously mentioned activities, MACODEV CBO actively participates in ecotourism endeavours, having established a community guest house. This initiative not only creates employment opportunities but also generates revenue for several community members. Furthermore, the CBO conducts programs focused on community training and awareness, emphasizing the value chain in honey production, and promoting soil conservation through organic farming, agroforestry, and crop rotation practices. Adding to their diverse initiatives, MACODEV CBO operates a radio station named "*SoGoot*", with the primary objective of disseminating essential information to the local community. Collectively, these practices contribute positively to the livelihoods of the Ogiek.

Collaborations between the department and Ogiek community has been created. Indigenous knowledge is integrated with modern day science and in other aspects. Through inspection of sheep's intestines, drought prediction has been conducted. Furthermore, the community members engage in communal sensitizations on fire outbreaks and water rationing. Similarity fifteen scouts from the community have been employed to serve as forest guards and report illegal activities. They are also tasked with the management of tree nurseries. For communication purposes, the scouts have been equipped with mobile phones.

Conflict between the Ogiek community, the government and other migrant communities was prevalent over the past few years. Given this, the department incorporated the national government administration officers and village elders in the conflict resolution process.

Furthermore, the department undertakes forest valuation against mature trees which does not consider the total value of the forest. Research institutions have partnered with KFS in conducting the valuation exercises**.** The department also advocates for the utilization

and sustainable stewardship of non-timber forest resources like gum Arabica and aloe vera, both of which are abundant in the Mau Forest. Due to budgetary restraints, currently KFS is not implementing forest conservation programs. The offer in charge emphasized the collaborative activities and conservation measures that have been put in place. He said:

(...) "As you can see, we have worked hand in hand with Ogiek community for a long time to ensure that we conserve Mau. I agree we have problems with certain community members that are encroaching on the forest, but we are committed to finding long-lasting solutions to the problems and amicably address the encroachment issues" (...) (Forester, Mr. Oletapi)

Finally, we noted that, the department advise against the Ogiek from raising goats due to the detrimental impact that they have on forest trees. Adapting to this aspect proves challenging for the Ogiek community and it is a source of conflict. Goats are among Ogiek's preferred domestic animals. This is partly attributed to the fact that goats demand less intensive management, and additionally, they serve as a crucial source of both meat and milk.

4.8 Compensation for the Forest Eviction of the Ogiek Community

According to the human rights groups interviewed-Ogiek People's development program, in 2009 a 21-day eviction notice was served by the Kenya Forest Service. This threatened to cause harm to the community. The Ogiek People's Development Programme (OPDP) petitioned the African Commission on this. OPDP's complaints led the Commission to conclude that mass rights violations were taking place. In March 2012, the Commission referred the case to the African Court for adjudication and started documenting offenses committed as evidence to support their case with the African Union Commission and the African Court. Permissive laws continued to allow industrial agriculture to advance into Ogiek territory.

In May 2017, the Ogiek people succeeded getting their rights recognised. The African court found the Kenyan government guilty of

violating the Ogiek's right to property, natural resources, culture, and religion and recognised them as an Indigenous community. Now, the Ogiek are asking for the full implementation of the court's ruling including compensation and reparations.

5.0 SUMMARY OF MAIN FINDINGS, CONCLUSIONS AND RECOMMEDATIONS

5.1 Introduction

This chapter provides a synopsis of the findings, as well as conclusions and recommendations derived from the study's objectives. This section is in three main parts. Firstly, we discuss the summary of the findings organised according to the objectives of this study. We specifically examine how forests contribute to the alleviation of poverty, the socio-economic livelihood options of Ogiek households, and the socio-economic and environmental impact of Ogiek's. Secondly, we conclude and provide recommendations on what can be done to enhance the participation of the Ogiek in the conservation of the Mau Forest. Lastly, we present the areas that require further research.

The conceptual framework aided the study in data analysis and presentation of findings by assessing the landscape demands of Mau Forest. Focusing on Ogiek's lifestyle and the livelihood resources that they attain from the forest. Secondly, in the assessment of the stakeholders engaged in Mau Forest conservation, existing collaborations. Similarly, the involvement of the Ogiek community in forest conservation, capacity building about sustainable forest management, access to forest conservation information, and existing conflicts between stakeholders. Lastly, in the evaluation of the impact of Mau Forest conservation on Ogiek's livelihood and sustainable forest conservation.

5.2 Summary of the Findings by the Objectives

The study's goal assessed the link between livelihoods, sustainable conservation, and the Ogiek Indigenous community of Molo Sub County. To achieve the general objective, the research used three specific objectives as follows; to analyse the socio-economic and environmental challenges facing the Ogiek community; to examine the sustainability of the main forest resources that support the

Ogiek community's livelihood, and to assess collaboration challenges between Ogiek community and other stakeholders in promoting sustainable livelihood and conservation of Mau Forest in Molo Sub County.

5.2.1 Socio-Economic and Environmental Challenges Facing Ogiek Community

The results indicated that socio-economic and environmental factors have influenced societal decisions made by the Ogiek people. The community fully relies on the Mau Forest for their livelihoods. The government however considers the Ogiek community as being illegal encroachers, accused of their illegal forest activities and unsustainable behaviour which leads to environmental degradation. This has resulted in the Ogiek community evictions from Mau Forest. The reported evictions were characterized by incidents of violence and human rights abuses. Despite the adverse impact of the evictions on the Ogiek's livelihood, the government did not provide compensation for the loss of property, land, and injuries incurred during the forced removals.

Furthermore, the government has placed restrictions on Ogiek's household use rights to the forest access. The government through KFS made arrests and prosecutions to anyone who bypassed these regulations. These restrictions have tremendously affected Ogiek's access to and use of forest resources. Ogiek community relies on on-timber forest products (NTFPs), among them medicinal plants, fuelwood, forest fruits, and vegetables, for their livelihoods, for both consumption and generation of income. These restrictions led to negative impacts on Ogiek's livelihood, resulting in increased poverty and vulnerability. Moreover, Ogiek did not welcome such restrictions, to them, they were pointless and unwelcome. In the same way, the restrictions have brought about an intense sense of hostility between Ogiek and government officials.

These have further resulted in conflicts majorly between the Ogiek community and the government and between the Ogiek community and the neighbouring communities. These conflicts have negatively

affected Mau Forest conservation. The lack of sustainable forest conservation has had a direct negative impact on the livelihood of the Ogiek since they highly depend on the forest for its resources. In the same manner, the conflict between the Ogiek and neighbouring communities has led to mistrust between the communities. This has affected the trading relationship between the two communities thus influencing Ogiek's income from trade.

In the same way, the evictions have also led to the breakdown of trust and relationships among the Ogiek community themselves and the social capital system. Thereby, the harm has had an impact on the poorest members of the community because over the years they have relied upon their traditional institutions for guidance, support, information, and help and benefit from the development of social capital.

5.2.2 Sustainability of Forest Resources for Ogiek Dependent Community

Study findings show that Ogiek's recognition as a key actors and full participation in Mau Forest conservation is a prerequisite for enabling sustainability. The involvement of the Ogiek community in the conservation of the forest is a shared commitment by the conservation stakeholders interviewed. However, the Department of Forest in Molo Sub County partially involves the community. A large population of the Ogiek feel left out in the process and as such they have developed indifference towards the government.

Several pilot programs such as the Kenya Climate Smart Agriculture program funded by the World Bank have been implemented. This program aimed at working with organized community groups to conserve the forest through the establishment of livelihood interventions to boost the capacity of the community. Such programs are not sustainable due to a lack of trust between the local community and the government.

Furthermore, the community members are only involved during the project implementation phase. The failure of forest conservation programs has been due to a lack of consideration of Ogiek's knowledge and attitudes concerning forest conservation when designing and implementing forest conservation programs. Furthermore, the promotion of awareness regarding forest conservation and sustainability among the Ogiek community has not been adequately emphasized by KFS and other conservation stakeholders working in the region.

Similarly, a higher percentage of the respondents noted that they are not enrolled members of CFA and thus are not involved in any activities conducted by CFAs. The high amount of non-involvement in CFAs correlated with the high number of household members who do not engage in forest conservation activities. It is also apparent that Ogiek has not been involved in any forest conservation policy development local meetings. There exists a lack of adequate consultation and poor communication of the policy development process. This has resulted in a vacuum of information which a few local elites have taken advantage of by influencing the policy development process.

5.2.3 Collaboration Challenges Between Ogiek Community and Other Stakeholders

Forest conservation is a joint initiative between the community and other key stakeholders. The government and other developmental organisations have put in place efforts to promote sustainable livelihood conservation. Ewaso Nyiro Development Authority has been working with the Ogiek community to support beekeeping and honey production. The project aimed to improve Ogiek's livelihood while motivating them to conserve the forest.

Furthermore, the government through KFS has employed 15 scouts who guard the forest and provide intelligence information about illegal activities in the Mau Forest. The scouts also support in propagation of tree seedlings for reforestation programs. The biggest challenge is that

these interventions only target the elite in the community who form an exceedingly small percentage. Secondly, these interventions are on a short-term basis making it difficult to achieve a greater impact on a bigger scale in forest conservation. Moreover, inter-community conflicts between the Ogiek and “immigrant communities” have derailed the process of building a common ground to support sustainable livelihood efforts.

In addition, there are local traditions that have hampered successful collaborations towards forest conservation. Traditionally, women within this community do not own land and thus do not have any direct rights towards decision-making and benefits acquired from forest conservation programs. This has posed challenges for women's full involvement and active engagement in forest conservation initiatives.

Due to evictions, the Ogiek community took legal action against the government. These matters before the court have taken longer than expected to be finalized therefore creating a bigger divide among the population living in the forest. This divide has further affected collaborations with other stakeholders.

Despite facing these challenges, the Ogiek community is eager to participate in conservation efforts for the restoration of Mau Forest. They are committed to contributing their indigenous knowledge and actively engaging as equal stakeholders in conservation programs.

5.3 Conclusion

Ogiek community heavily relies on the forest for their livelihood through the utilisation of forest products and services. The eviction from the forest has had both a negative and positive impact on their livelihood. On one hand negative especially for those members that are not capable of undertaking alternative livelihood activities apart from their traditional ways of life. On the other hand, positive to a few Ogiek community members who have been able to diversify their livelihood through the cultivation of cash crops, beekeeping, and animal rearing.

The government and other stakeholders have put in place conservation programs that have targeted a smaller percentage of the Ogiek community. These programs are therefore not sustainable and bound to fail because Ogiek community has not been fully involved in all the phases of the conservation process. Moreover, due to the evictions, the Ogiek's are suspicious and have a negative attitude towards any conservation program. Furthermore, low levels of education, inter-community conflicts, and inadequate communication have contributed to low levels of participation of the Ogiek in the sustainable Mau Forest conservation. This was substantiated by the observation that most of the Ogiek community the Ogiek's could not access opportunities offered by the government and other stakeholders, only a few elite members could access them.

Collaborations have occurred but at an exceptionally low scale. Several factors for example conflict and mistrust have hindered successful collaborations between stakeholders.

5.4 Recommendations

The following recommendations were thus advanced from the findings of this study:

- The government should collaborate with the community elders to utilize Indigenous knowledge to support interventions. It is therefore essential to involve indigenous educational approaches such as community dialogues, oral traditions passed down by community elders, apprenticeships, and indigenous innovations. These methods play a pivotal role in fostering sustainable ecological conservation within the framework of Indigenous cultural practices.
- The Ogiek community observes established traditions, customs, norms, and informal governance structures, all of which are held in high regard by all members of the

community. The government ought to capitalize on them, be receptive and demonstrate a willingness to incorporate them into formal legal frameworks.

- It is crucial to prioritize the needs of Ogiek Indigenous community in resolving ancestral land claims. This can be achieved either through the direct implementation of provisions in the Community Land Act, focusing on adjudication and registration, or by initiating investigations into historical land claims and injustices.

- The government through KFS and other agencies involved in Mau conservation programs should revise their communication strategy and utilize suitable channels to disseminate information to the community. This may include forums like barazas, communal celebrations, and the involvement of traditional leaders in conveying important messages.

- The government to strengthen the existing CFA groups and allow for more participation from Ogiek community. Intensification of capacity building and empowering measures must be put in place to bring to fruition the conservation potential of the Ogiek.

- To resolve the existing conflict, the government ought to (1) create space for dialogue between community members and external actors; (2) Strengthen Ogiek's social capital; (3) be able to recognise and adopt traditional customs and norms; (4) initiate collective choice arrangement system.

- The government through KFS to bring diverse stakeholders' groups together, including communities, developmental organisations, private sector, and researchers. This can become an opportunity to rethink existing perceptions of each other.

- The government and other development stakeholders to recognise Ogiek community as a key stakeholder in Mau Forest conservation, for that allowed to fully participate in its conservation programmes.

5.5 Recommendations for Future Study

Subsequent studies should prioritize exploration into the following areas:

- Further research is necessary to assess the impact of migration on deforestation. There exists there is limited research exploring the extent to which migration poses a threat to Mau Forest conservation. Therefore, future studies should focus on examining the recent patterns of immigration to Mau Forest to better understand the potential implications for deforestation and conservation.

- Additional research should focus on the multifaceted dynamics of deforestation, particularly the role of the political system as a fundamental factor. There is need to expound how deforestation drivers are influenced by political forces. Furthermore, research should explore the complex interplay between political factors and deforestation dynamics, focusing on the complexities of resource governance and the implications for forest conservation efforts.

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FIGURES

Figure 1 Study Area

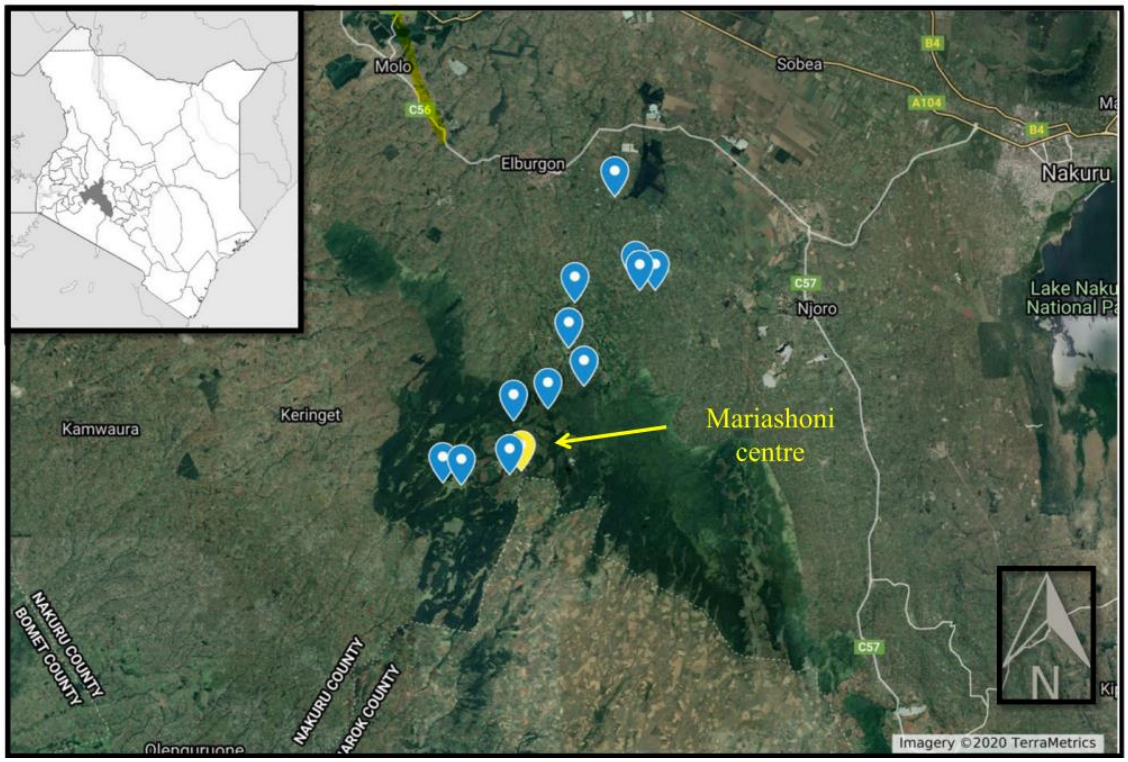
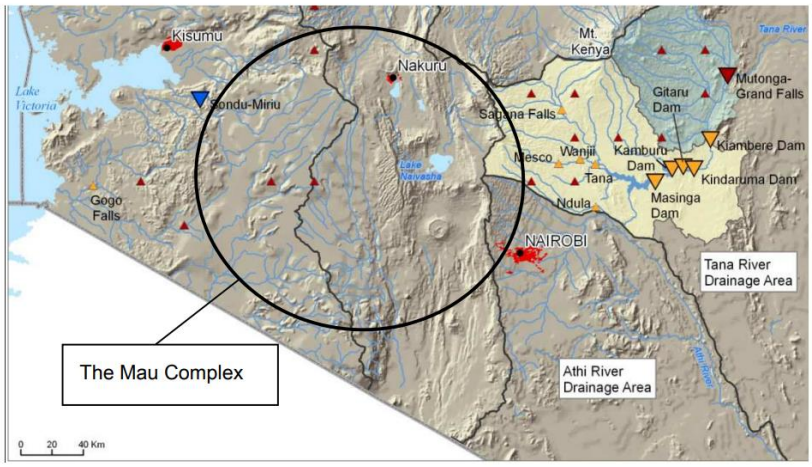


Figure 1 Source Author

Figure 2 MFC drainage network and its physical features



Source: World Resources Institute, 2007

ANNEXES

Annex I; List of Oral Informants Who did not Seek Anonymity

Name	Title	Date of interview	Location
Alexon Oletapi	Forester Mariashoni	05/01/2022	Mariashoni
Daniel Ngurule	Chief Mariashoni	07/01/2022	Mariashoni
Joseph Towett	Chair Ogiek, council of elders	06/01/2022	Nakuru
John Omam	Njoro Conservator	07/01/2022	Njoro
George Njoroge	Mau Conservator	07/01/2022	Njoro

Annex III; Pictures from the field

Figure 2 KII interview with the Forester Mr. Oletapi in Mariashoni forest station
Source; Author

Figure 3 A section of the planted forest where the Ogiek households undertook farming under the PELIS program.
Source; Author

Figure 4 A section of the CFA members and scouts tending to tree seedlings in their nursery.
Source; Author

Figure 5 Bee keeping project for Ogiek households and refined and packaged honey by MACODEV.
Source; Author (Beehives), MACODEV (Packaged Honey

APPENDIXES

Appendix I: Letter of Introduction

Rowan Alumasa Alusiola
P.O. Box66827
Nairobi, Kenya

Dear Respondent,

My name is Rowan Alusiola. I am currently pursuing a master's degree at Kenyatta University, conducting a research project titled "*livelihoods and sustainable conservation nexus with special reference to ogiek community within mau forest, nakuru county, kenya*" being a partial fulfilment of the master's degree in environmental studies (Community Development).

I kindly request you to be part of my research by filling in this questionnaire. Please answer all the questions with your true agreement to each. This will help me in developing relevant recommendations aimed at informing future conservation eviction as well as policy makers on involvement of the community in conservation. The information and data obtained will be confidential and solely used for academic purposes. Your sincere feedback would be greatly valued. Thank you in advance.

Best regards

Rowan Alumasa Alusiola

Reg.No; N50/CTY/PT/ 23016/2011

Appendix II: Questionnaire

Please give your honest and accurate answers/opinion to the questions below. All the information you give is going to be highly confidential. Please refrain from writing your name on this questionnaire.

Section A: Questionnaire Logbook

1. Questionnaire Identification Number …….
2. Date of Interview …….
3. Village Name…….

Section B: Background Information of the Respondent

4. What is your capacity when answering this questionnaire?
    a. Chief /Assistant chief ☐
    b. Head of Household ☐
    c. Spouse ☐
    d. d. Other ☐
5. Gender of the respondent
    a. Female ☐
    b. Male ☐
6. Do you have a formal education?
    a. Yes ☐
    b. No ☐
7. If yes above, at what level?
    a. Primary ☐
    b. Secondary ☐
    c. Collage/Technical ☐
    d. University ☐
8. What is the number of people in this household?
    a. Between 3-5 ☐
    b. Between 3-8 ☐

c. Between 3-15 ☐

d. 0ver 15 ☐

Section C: Activities in the household

9. What is the distance between your home and the forest?

a. less than 800M ☐
b. 800M-5 KM ☐
c. 5-15KM ☐
d. d. Over 15KM ☐

10. Do you access the forest?

a. Yes ☐
b. No ☐

11. If yes above, which forest products do you or any of your household members have access to? (Tick All that are appropriate)

Products	**Tick**
Firewood	
Tree Seedlings	
Honey	
Charcoal	
Fodder for animal	
Grass for thatching houses	
Medicinal Herbs	
Wild Meat	
Timber/Wood	
Wild Fruit	

12. How often do you access the forest for its services?

a. Daily ☐
b. Thrice a week ☐
c. Twice a month ☐
d. I do not access the forest. ☐

13. What is the main livelihood activity for this community?

a. Lumbering ☐

b. Farming ☐

c. Trading ☐

d. All the above ☐

Other (Please mention here) ……

14. If your response above is (a) lumbering, please mention the way that it takes.
    a. Commercial logging ☐
    b. Logging by chainsaw ☐
    c. Fuelwood & Charcoal ☐

Section B. Sustainable Forest management

15. What are some of the main limitations to your livelihood activities?
    a. Restrictions from accessing forest resources by the project proponents and the government. ☐
    b. Forest cover reduction in size ☐
    c. Eviction from your homes by the government ☐
    d. Loss of biodiversity ☐
    e. All the above ☐

16. Do you think your daily actions may have caused to the decrease in size of forest cover in one way or the other?
    a. Yes ☐
    b. No ☐
    c. I do not Know ☐

17. Have you been able to gain access information on forest conservation?
    a. Yes ☐
    b. No ☐
    c. I do not Know ☐

If yes, what are the sources of the forest conservation information?

a. Kenya Forest Service ☐
b. NGO Officers ☐
c. Radio ☐
d. Television ☐
e. Social Media ☐
f. SMS ☐
d. other sources ☐

Please mention them……

18. Do you have any knowledge about sustainable forest management?

a. Yes ☐
b. No ☐
c. I do not know. ☐

19. How often have you been involved in sustainable forest conservation activities in over the five years?

a. Not often ☐
b. Often ☐
c. Very Often ☐

20. How often do Kenya forestry service officers and NGOs talk to you about sustainable forest management?

a. a. Yearly ☐
b. every 6 months ☐
c. every 3months ☐
d. d. monthly ☐
e. weekly ☐
f. Never ☐

21. In which form have they interacted with you?

a. workshops ☐
b. Local baraza ☐

c. Projects ☐

22. How many times have you or any member of your household taken part in the events above over the last five years?

    a. Between 1-5 times ☐
    b. Between 5-10 times ☐
    c. Between 10-15 times ☐
    d. Over 15 times ☐
    e. Never ☐

23. Has any of your household members been involved in the design of a project in the last five years?

    a. Yes ☐
    b. No ☐

If yes, please mention which one it was.

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24. Please mention some of the projects that you and your household has been engaged in implementation over the last five years.

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25. Are you or anyone in your household a member of Community Forest Association (CFA)?

    a. Yes ☐
    b. No ☐
    c. I do not know. ☐

If yes, what activities do, they engage in?

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26. In your opinion, please mention some of the things that the government and project proponents/implementors should implement to ensure that Mau Forest is sustainably conserved.

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Section D; STAKEHOLDER COLLABORATIONS

27. Are there any collaborations between the local community, CFA, KFS and NGOs?
    a. Yes ☐
    b. No ☐
    c. I do not know. ☐

28. Have you personally or a member of your household been involved in the collaborations?
    a. Yes ☐
    b. No ☐
    c. I do not know. ☐

If yes, do you feel that the collaborations were/are successful?

a. Yes ☐
b. No ☐
c. I do not know. ☐

If No, please mention some of the challenges that you have experienced.

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If yes, please mention some of the things that made it to be successful.

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29. Do you agree that collaboration between the community and other stakeholders in the conservation and management of forest resources contributes to its sustainability?

    a. Yes ☐
    b. No ☐
    c. I do not know. ☐

    If yes, please give a reason.

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30. In your opinion, what are some measures that should be followed to ensure successful collaborations?

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Section E: Disagreements/Conflicts between forest livelihoods and Conservation

31. Has forest conservation and use been affected by any conflicts between your community, the government and project proponents? (Tick one)

i.	Forest use and conservation id rarely interfered with conflicts between the government, project proponents and the community because they are not serious	
ii.	Conflicts have occurred between the community, project proponent and the government and they have interfered with forest conservation and use	
iii.	I have no idea	

32. Are there conflicts between your community/village and another neighbouring one due to forest resources use and access? (Tick one)

i.	Conflicts have not been experienced between our community/village and any other	
ii.	Conflicts have occurred, but they do not disrupt access to or utilization of forest resources.	
iii.	Conflicts have occurred and they have interfered with forest resources access and utilization	
iv.	I have no idea	

33. Have conflicts regarding the use and management of forest resources persisted or have they been adequately resolved? (Please indicate with a tick)

i.	Conflicts are swiftly and effectively resolved	
ii.	Some conflicts are resolved efficiently while others persist	
iii.	Conflicts tend to persist indefinitely.	
iv.	I have no idea	

34. How are conflicts resolved? (Tick one)

I. Informally	
ii. Formally e.g., going to court	

iii. Both formally and informally	
iv. I have no idea	

35. In your opinion, what do you think should be done to resolve the existing conflicts?

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APPENDIX III: Interview Guide for Key Informants

Please give your honest and accurate answers/opinion to the questions below. All the information you give is going to be highly confidential. Please refrain from writing your name on this questionnaire.

Section A: Questionnaire Logbook

1. Questionnaire Identification Number…….…….....
2. Position/Responsibility …….....
3. Organization Name…….....
4. Department/Section……
   …
5. Date and Place of Interview …….....

6. Has your department/ organization over the last 10years developed and implemented new law/bill/development plans to indorse sustainable management and use of forest resources?
    a. Yes. ☐
    b. No ☐
    c. Not applicable ☐

If yes, please in brief provide us with an outline and/or attach any documents.

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7. Does the department/ organization consider future generations needs whilst making plans for sustainable management and use of forest resources?
    a. Yes. ☐
    b. No ☐
    c. Not applicable ☐

If yes, please in brief provide us with an outline and/or attach any documents.

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8. Has the department/Organization implemented any programmes to promote sustainable forest management and use?
    a. Yes ☐

b. No ☐

c. Not applicable ☐

If yes, please in brief provide us with an outline and/or attach any documents.

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9. Did the department/organization fully involve the Ogiek community in the development process of the policies and or programmes?
   a. Yes ☐
   b. No ☐
   c. Not applicable ☐

If yes, how, and what was their attitude towards the process? Did they actively participate or where they perceive? Please briefly explain.

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10. Has social, economic, and environmental values been incorporated in the planning procedures for sustainable use of forest resources by your department /organization.
    a. Yes ☐
    b. No ☐
    c. Not applicable ☐

If 'Yes,' please briefly mention them below.

i). Environmental Values

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ii). Economic Values

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iii). Social Values

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Involvement of Ogiek Community

11. Do the programmes developed (above) address specific needs of Ogiek community, including supporting activities that mainstream Indigenous Knowledge into management of forests sustainably?

    a. Yes ☐

    b. No ☐

    c. Not application ☐

If yes, briefly summarize your responses below.

a). Social Needs

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b). Economic Needs

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12. Has your organization/department developed any conflict resolution mechanisms that has been used during the eruption of conflicts in Mau Forest?
    a. Yes ☐
    b. No ☐
    c. Not application ☐

If 'Yes,' briefly describe the mechanism in place.

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13. Does your organization/department support any collaborations with the Ogiek community or any conservation groups within the community?
    a. Yes ☐
    b. No ☐
    c. Not application ☐

If 'Yes,' briefly mention existing collaborations, or attach any details.

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14. Are there any measures that your organization/department has set across to ensure that the collaborations (above) are successful?
    a. Yes ☐

b. No ☐

c. Not application ☐

If 'Yes,' briefly summarize them or attach any details.

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Forest Valuation

15. Environmental, Social and Economic values of forest resources and services are key to conservation. Has the department/organization evaluated these values?
    a. Yes ☐
    b. No ☐
    c. Not application ☐

If 'Yes', briefly summarise the findings or, attach any details

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16. Does your department/organization promote modelling tools for sustainable forest management?
    a. Yes ☐
    b. No ☐
    c. Not application ☐

If 'Yes,' please briefly outline below.

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17. Monitoring sustainable forest use is key to successful forest conservation. Does the department/organization have any indicators to evaluate improvement in the implementation of the policies?
    a. Yes ☐
    b. No ☐
    c. Not application ☐

If 'Yes,' briefly explain or attach any details.

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Does your organization/department endorse the sustainable stewardship and utilization of Non-Timber Forest Resources?

If 'Yes,' mention below on how it conducted or attach any details.

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18. How does your organization/department monitor unsustainable uses of forest resources? Briefly summarise the methodology, criteria or tools and reporting process.
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19. Are there any plans for innovative programs that are going to increase sustainable forest management and reduce conflicts with the indigenous community in Mau Forest? If yes, briefly outline them.

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