ECOLOGICAL CHANGE AND FOOD SECURITY IN ELGEYO MARAKWET COUNTY, KENYA, 1850-2013

By

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT FOR THE REQUIREMENT OF THE AWARD OF THE DEGREE OF DOCTOR OF PHILOSOPHY IN HISTORY OF JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

JANUARY 2024

DECLARATION

Declaration by the Candidate

This thesis is my original work and has not been presented for an award of a degree or diploma in any other university or institution.

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DEDICATION

In profound appreciation, I dedicate this thesis to my parents, Kenneth K. Cherop and Teresia J. Kipkemboi, whose love and sacrifices are etched in every page of this thesis. Your unwavering support has been my greatest inspiration.

ACKNOWLEDGEMENT

The successful completion of this thesis is attributed to invaluable contributions and support of numerous individuals who deserve to be recognized. Foremost, I extend my profound gratitude to my thesis supervisors and mentors, Dr. Samwel Ong'wen Okuro (PhD) and Dr. George Odhiambo Okoth (PhD), to whom I am greatly indebted for always sacrificing their time to read, correct, and guide my thesis on time. They have been a great source of inspiration and encouragement in all stages of this thesis. Thank you for nurturing me into the world of scholarship.

I am grateful to Jaramogi Oginga Odinga University of Science and Technology for offering me the opportunity to undertake a doctorate degree program in history. I also acknowledge the support I received from the Department of Social Studies at Jaramogi Oginga Odinga University of Science and Technology. Special thanks go to Dr. Fredrick Z.A. Odede (PhD), the chairman of the department, and Dr. Isaya Oduor Onjala (PhD), for their indispensable assistance.

I do register my appreciation to the members of staff of Jaramogi Oginga Odinga University, Moi University, and Masinde Muliro University Libraries. I also acknowledge all my respondents and staff from the Kenya National Archives in Nairobi, Kerio Valley Development Authority, Forest Department, and Department of Agriculture, Livestock, Fisheries and Irrigation in Elgeyo Marakwet County for their selfless assistance.

I thank all my informants, whose names are appended at the end of this thesis, for sacrificing their time to participate in the oral interviews. I am particularly grateful to Mzee John Chebii Cherwon for introducing me to other informants who acted as my contact persons. To my research assistance, Victor Korir, Bethwel Kibet Kipkemboi, and Justine Kibet Kemboi, I salute you.

To my family members, including my grandmother Kimoi Kop Maiyo, my father Kenneth K. Cherop, my mother Teresia J. Kipkemboi, and my siblings Kiprotich, Kipchumba, Kibet, and Jepkosgei, thank you for cheering me on.

Finally, I owe special gratitude to my spouse Risper Kimutai and my children Leon Kemboi and Leona Kemboi for their moral support. This thesis would not have come to completion were it not for your encouragement, love, and support. Thank you for always being there for me.

To you all, I say, God bless you!

ABSTRACT

Ecological change is a significant hindrance to Kenya's development aspirations outlined in Vision 2030. Kenya is inherently susceptible to ecological-related hazards, with severe weather and unpredictable rainfall now being the prevailing patterns. The majority of people in arid and semi-arid regions of Kenya are agro-pastoralists, whose means of subsistence are cultivation of crops and rearing of animals. Ecological factors play a crucial role in shaping and influencing these production processes. More than half (78%) of the families in Elgeyo Marakwet generate income from cultivation of crops and rearing of animals, with crop production accounting for 66% of their total household earnings. Ecological changes in Elgeyo Marakwet, however, have resulted in decline in crop and livestock yields and an increase in production expenses. About 73.3% of households in the County experience food insecurity, and 57% live in poverty, which is higher than the national average of 46%. This study focus was to analyze historical influence of ecological change on agro-pastoral economy and food security in Elgeyo Marakwet County from 1850 to 2013. It aimed to examine the interplay between Elgeyo Marakwet's agro-pastoral economy and its ecological system. It sought to evaluate factors that influenced transformation of ecology and its impact on food production and food security during the colonial period, and finally, it aimed to ascertain the impact of government policies and legislations on ecology and food security in the post-colonial era. The research was conducted in Elgeyo Marakwet County using a historical research design. Individuals who were specifically targeted included the elderly (both men and women), ex-colonial administrators, retired post-colonial administrators, experts in ecology and professionals in forestry, farmers, agricultural officers, and staff members of the KVDA. Purposive and snowballing sampling techniques were used to select 64 informants. Archival sources and secondary sources were utilized to enhance the knowledge obtained from field interviews by corroborating and triangulating the data. The data underwent content and thematic analysis, resulting in the identification and categorization of themes and sub-themes aligned with the study's aims and human ecology theory. The study established that Elgeyo Marakwet's agro-pastoral economy functioned within a system of comprehended and controlled ecology, which relied on indigenous knowledge to ensure adequate food production and food security in the pre-colonial era. It has demonstrated that the implementation of colonial rule and the introduction of colonial policies and practices such land alienation and settler squatter systems, wage labour and tax policies, introduction of new crops, and destocking policy, had a negative impact on the Elgeyo Marakwet's ecology, agropastoral economy and food security. Furthermore, the study revealed that post-colonial government policies and legislations on agro-pastoral production in Elgeyo Marakwet had a significant impact on the region's ecology, agro-pastoral economy, and food security. Therefore, the study concludes that Elgeyo Marakwet region has been subjected to food insecurity due to great ecological changes resulting from colonial and post-colonial government policies and legislations on agro-pastoral economy. The study recommends that traditional institutions and knowledge remain central to ecological management and agro-pastoral economy, and should be maintained and integrated into the various government policies and legislations to ensure a sustainable ecology, agro-pastoral economy and food security. The study's findings provide valuable insights on ecological change that have the potential to enhance and sustain agro pastoral production and food security. These insights are useful to policy-makers responsible for making well-informed decisions on ecological conservation and management, as well as agro-pastoral economy and food security. Given that the terminal point of this study was 2013, when County governments were established following Kenya's general election on March 4, 2013 under the 2010 constitution, and agriculture being a devolved function, this study suggests further research on the role of County governments in ecological management and conservation, agro pastoral production and food security in marginal areas.

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ABBREVIATIONS AND ACRONYMS

ALDEV	African Land Development
ASAL	Arid and Semi-Arid Lands
DAO	District Agricultural Officer
DC	District Commissioner
E.M. S	Equator Saw Mill
GOK	Government of Kenya
FAO	Food and Agriculture Organization
FGDs	Focus Group Discussions
KFS	Kenya Forest Services
KNA	Kenya National Archives
KNBS	Kenya National Bureau of Statistics
KVDA	Kerio Valley Development Authority
LNC	Local Native Council
MoALF	Ministry of Agriculture Livestock and Fisheries
NACOSTI	National Council of Science, Technology and Innovation
NGOs	Non-Governmental Organizations
NIB	National Irrigation Board
O. I	Oral Informant
UNEP	United Nation Environment Programme
WB	World Bank
WFP	World Food Programme
WHO	World Health Organization

OPERATIONAL DEFINITION OF TERMS

Agro-pastoral Economy -Refers to a type of agriculture which involves growing of crops and raising of livestock.

Cattle raiding- is defined as acquisition or stealing of livestock from one community by another community without destroying property or killing people.

Cattle rustling- is defined to mean forceful acquisition of livestock from one community by another community using guns or other weapons and in turn leaving behind destruction of property and loss of lives.

Colonial Policies-This are exploitative and oppressive European colonial rules and regulations over African people in Kenya, and particularly in Elgeyo Marakwet between 1895 and 1963.

Colonialism- This is the practice of a nation dominating another one. In this study, it is used as a phenomenon by which Europeans conquered, settled and acquired political and economic control over Kenya and by extension Elgeyo Marakwet for their own benefits.

Depastoralization- is defined in this study to mean act of reducing number of livestock among the people of Elgeyo Marakwet through various colonial policies and legislations.

Ecological Change- Refers to transitional process of disturbance, alteration, modification, transformation and variation from one form or state to another of environment by either human influence or natural processes.

Ecology- refers to interaction between humanity, plants, animals, soils and water in process of resource utilization.

Elgeyo- Are an ethnic group that is part of the larger Kalenjin ethnic group of Nilotic origin. They currently inhabit Elgeyo Marakwet County. Elgeyo are also known as Keiyo.

Marakwet- Are one of the groups forming ethno-linguistic Kalenjin community of Kenya. They live in Elgeyo Marakwet County.

Elgeyo Marakwet - for purposes of this study will refer to the Elgeyo and Marakwet people inhabiting Elgeyo Marakwet County, as well as the area inhabited by the people of Elgeyo and Marakwet.

Food Production- Refers to deliberate process of raising or cultivating edible plants and keeping of domestic animals for human consumption.

Food Security- is when all people at all times have both physical and economic access to sufficient and healthy food.

Human Ecology- is the study of relationship between humans and their natural environment.

Impacts- These are meaning drawn from ecological and agro pastoral production changes that were brought by European colonialism, and by post-colonial government policies and legislations in Elgeyo Marakwet.

Indigenous Knowledge- These are well established collection of skills, knowledge, innovations, and practices, which were developed by the people of Elgeyo Marakwet from an advanced understating of their ecology.

Non-Governmental Organizations (NGOs) - For purposes of this study, the term NGOs is used to refer to financial institutions, donor agencies, churches and Community Based Organizations (CBOs) among others.

Relief food-refers to various food types of assistance given in form of edible substances to assist local communities by government and NGOs agencies.

Shamba system-refers to scientific management of forests whereby tree seedlings are planted together with food crops basically to help in tendering the seedlings up to 3-5 years when the trees are considered mature.

Shaping- For purposes of this study, the term shaping is used to refer to, to transform or to modify or to alter.

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

Food is the most essential resource, second to oxygen and water (FAO, 2013). Food insecurity is widespread, and there is a growing concern worldwide (Kariuki, 2014). Food insecurity has continued to be a major challenge in various regions, with over one-third of global population experiencing food insecurity (Cherop, 2019). The World Food Security Summit of 1996 states that food insecurity occurs when people lack long-term physical and economic access to adequate, safe, nutritious, and acceptable food for health and productive life (FAO, 1996). Globally, it was estimated that a total of 842 million people in 2011–2013 were suffering from food insecurity (FAO, 2013).

Food security challenges have recently gained traction in Africa (Gitu, 2004; Kisaka, 2009; Cherop, 2019). Concerns about effects of food insecurity on economic development are also on the rise (Wangari, 2010). According to research conducted by Shauri (2011), Africa is one of world's most afflicted continents in terms of drought and famine. Food insecurity in Africa has had a disproportionately negative impact compared to any other calamity (Tor, 1995). Its impact is due to a variety of factors, including population growth, insufficient economic development, and an overreliance on rain-fed agriculture in semi-arid areas (Gitu, 2004).

Agro-pastoralism serves as main source of livelihood for inhabitants of arid and semi-arid regions (Cherop, 2020). These areas have undergone significant transformations, especially due to colonial and post-colonial socio-economic policies (Kisaka, 2009). The main challenge in these semi-arid areas is how to ensure food security is sustainable in an environment susceptible to drought and famine (Kareithi, 2000; GOK, 2008). Cherop (2020) posits that with proper management, these areas can significantly enhance and sustain food

production and food security. However, achieving this requires a comprehensive understanding of interaction between human activities and environment. While human activities have an impact on environment, environment also influences human actions creating a complex and unique interaction that exists uniquely in every given geographical area.

Scholarly studies on Kenyan communities have similarly demonstrated interaction between humanity and their environment. For instance, Waweru (1992) and Nyanchoga (1999) noted that in the pre-colonial period, Turkana community relied on their environment for seasonal grazing of their livestock between the escarpments and lowlands. Conversely, Idakho and Isukha communities of western Kenya depended on their bio-diversity for sources of food, such as game, fruits, herbs, leaves, and roots, as well as ornamental items for various cultural rites (Kizito, 1998).

The pre-colonial people of Marakwet also utilized their environment for food acquisition purposes through activities such as furrow irrigation agriculture, hunting, gathering of fruits, vegetables, and termites (Cherop, 2020). This historical evidence underscores longstanding interaction between humans and their environment for sustenance and other purposes. However, historians have generally devoted less attention to examining this interaction comprehensively. The few existing studies on ecology by historians, including Ogot, 1979; Waweru, 1992; Matheka, 1992; Kizito, 1998; Lemoosa, 1998, Nyanchoga, 1999 and Cherop, 2020, have majorly focused on socio-economic and political aspects of society and nomadic pastoralism in relation to ecology. Furthermore, these studies often lack detailed exploration of temporal and spatial changes in ecology and society, and their implication on agro-pastoral economy and food security.

Studies conducted in Elgeyo Marakwet by Chesang, 1973; Ruttoh, 1988; Kipkorir 1993; Tarus, 1994; Chebet and Dietz, 2000; Cheserek et al , 2013; Changa'ch, 2015; Chebii, 2018, and Cherop, 2019 have also given little attention to themes related to ecology, agro-pastoral production, and food security. Scholars such as Sindiga, 1981; Matheka, 1992; Waweru, 1992 and Kizito, 1998 have also highlighted dynamic and symbiotic relationship between nature and humanity. These interactions between bio-geophysical environment and human activities are crucial for agro-pastoral production, forming the basis of food systems that underpin food security. This study aimed to explore dynamism of ecology, agro-pastoral economy and food security in Elgeyo Marakwet, to shed light on this interconnected process.

1.2 Statement of the Problem

Interest in historical aspects of ecological change in Africa has been prompted by concerns regarding environmental degradation and food insecurity in the continent. This particular study was motivated by necessity to examine how ecological changes have influenced food security in Elgeyo Marakwet County, Kenya, 1850–2013. Over half (78%) of the Elgeyo Marakwet families earn money from crop and livestock husbandry. Crop production provides 66% of household income in Elgeyo Marakwet County, however, the County has 73.3% food insecure households and 57% poverty levels, surpassing national average of 46% (GOK, 2013).

The issue of food insecurity has resulted in stunted growth of 30% of children under the age of five years due to chronic malnutrition in the area (GOK, 2013; MoALF, 2017). Factors such as extreme rains, high temperatures, and droughts within the County are likely contributors to these conditions. These environmental challenges have led to diminished

agricultural and livestock production, increased production expenses, and posed risks to vulnerable groups including women and children (GOK, 2013; MoALF, 2017).

While studies on agrarian challenges in Elgeyo Marakwet County exist, they often lack a comprehensive wholesome conceptualization of ecological history of the County cutting across historical periods from the pre-colonial through colonial and post-colonial epochs. These historical periods witnessed diverse ecological developments that impacted food security in different ways. Studies by Kipkorir & Kareithi (2013) and Cherop (2020) explored the phenomenon in sub-themes focusing on independent developments, for instance, furrow irrigation, crop production, and livestock economy, without underscoring inherent impact of dynamics of ecological change over time and space. Moreover, these studies did not comprehensively address different responses adopted in mitigating these conditions and their subsequent effects on agropastoral economy and food security with respect to historical periods.

Although ecological histories do not fall neatly within specific time frames, there is need for a systematic analysis of ecological history in the context of the pre-colonial, colonial, and post-colonial periods in Elgeyo Marakwet to establish the underlying causes of food insecurity. Therefore, comprehending food security problems in Elgeyo Marakwet County necessitates critical examination of evolving relationship between humans and their environment over both temporal and spatial dimensions. Thus, the study on ecological change and food security in Elgeyo Marakwet County, 1850-2013.

1.3 General Objective of the Study

The purpose of this study was to historically analyze ecological change and food security in Elgeyo Marakwet County, Kenya, 1850-2013.

1.3.1 Specific Objectives

This study was guided by the following specific research objectives:

(i) To examine interaction between agro-pastoral economy of the people of Elgeyo Marakwet and their ecology, 1850-1895.

(ii) To evaluate factors that led to transformation of the Elgeyo Marakwet ecology and their impacts on food production and food security during the colonial period, 1895-1963.

(iii) To establish the role of government policies and legislations on the Elgeyo Marakwet agro pastoral economy and their effects on ecology and food security in the post-colonial period, 1963-2013.

1.4 Research Questions

The study attempted to answer the following research questions:

(i) What was the relationship between the agro-pastoral economy of the people of Elgeyo Marakwet and their ecology in the pre-colonial period, 1850 -1895?

(ii) What was the impact of colonialism on the transformation of Elgeyo Marakwet ecology and food security during the colonial period, 1895-1963?

(iii) What were the effects of government policies and legislations on the Elgeyo Marakwet's ecology, agro pastoral economy and food security in the post-colonial period, 1963-2013?

1.5 Justification of the Study

This research stems from recognition of a significant gap in awareness about ecological issues within social sciences, particularly in history. The Elgeyo Marakwet region has experienced a substantial decline in livestock and crop production (GOK, 2013). This has caused chronic food insecurity in the area, especially in the hanging valley or escarpment and Kerio Valley ecological zones. Unfortunately, there is a paucity of research investigating underlying reasons for the decline in food crops and livestock production.

Similarly, numerous studies on food security are on continental, regional, and national levels, often resulting in overly general conclusion given their broad coverage. This study posits that ecology and food security are geographically specific phenomena, and thus their analysis requires systematic local studies. Therefore, this research focused specifically on ecological change and food security in Elgeyo Marakwet County.

In addition, most of the post-colonial initiatives aimed at improving food security have failed due to underestimation of ecological constrains that pre-colonial societies had mastered and managed. Thus, it is imperative to study ecological conditions of the pre-colonial, colonial, and post-colonial periods to provide economic planners information tailored to the African situation, thereby addressing the issue of food insecurity.

Furthermore, the primary custodians of knowledge regarding ecological change and food security, the elderly men and women, are rapidly passing away. This study hoped to capture this invaluable repository of information before disappearance of the few available knowledgeable individuals because they are the generation who directly or indirectly experienced ecological changes in the pre-colonial, colonial, and post-colonial Elgeyo

Marakwet. Consequently, it calls for this study to record their experiences while it is still feasible. The main focus of this study, therefore, was to analyze ecological changes that have occurred in Elgeyo Marakwet, with specific reference to the pre-colonial, colonial, and post-colonial periods, and to establish their impact on agro-pastoral production and food security in the study area.

1.6 Significance of the Study

The theme of integrating food production with ecological management planning is crucial to both the current and future human generations. This study provides invaluable insights into ecological changes and food security in Elgeyo Marakwet County from 1850 to 2013. The findings of this study are essential for identifying appropriate interventions that can enhance ecological management and conservation, agro-pastoral production, and ensure food security in Elgeyo Marakwet county.

In terms of knowledge, this study has generated invaluable data regarding interaction of the pre-colonial Elgeyo and Marakwet communities with their environment, particularly in relation to agro-pastoral production and food security. It has also documented ecological transformation that occurred during the colonial and post-colonial periods. Furthermore, the study offers insights into how well today's ecological and food security crises can be tackled. Consequently, it presents potential solutions to ecological and food security problems facing the people of Kenya, and specifically the people of Elgeyo Marakwet, thereby providing a potential remedy to food insecurity.

In addition, this study has generated new insights on ecology, agro pastoral production and food security, thus enriching existing body of knowledge available on the topic of ecology

and food security. It has contributed to scholarly research and literature, especially on the aspect of ecological change, since it provides valuable knowledge that may have the potential to improve and sustain food security.

Findings of this study will be of great importance to scholars, ecological researchers and historians, food security researchers, and economic planners by aiding in understanding causes of food insecurity and enabling informed planning for the present without compromising the future in relation to ecology, agro pastoral production, and food security. Since human activities such as agro pastoral economy, are deeply interconnected with environment, it is important that historians elucidate aspects of social and economic change in relation to the physical environment as well as overall ecological setup in which they are evolving. This study is therefore significant in illustrating these relationships.

1.7 The Scope of the Study

This study examined ecological change and food security in Elgeyo Marakwet County from 1850 to 2013. Focus on the Elgeyo Marakwet was chosen to make scope of the research more manageable. This region is predominantly inhabited by the Elgeyo and Marakwet communities (GOK, 2013). The study began at about1850, a significant watershed in the history of the Elgeyo and Marakwet, as it marks period when these communities had settled in the area, including in highland ecological zone (Kipkorir, 1973; Massan, 1968; Tarus, 1994; Chebet and Dietz, 2000; Cherop, 2019).

The study's terminal point is the year 2013. This is the year when County governments were established following Kenya’s general election on March 4, 2013, under the 2010 constitution (GOK, 2013). The period of the study, 1850–2013, was chosen purposively to capture

ecological and economic transitions from the pre-colonial through colonial to the post-colonial periods, and to assess their impact on agro-pastoral economy and food security in Elgeyo Marakwet County. This timeframe provided an ideal context for analyzing the ecological changes and food security in the region.

1.8 Limitation and Delimitation of the Study

The researcher encountered problem of transportation due to topography of the area under study (Kerio Valley, escarpment, and highlands). Navigating these three ecological zones was costly and tiresome due to poor transport network. Financial resources and time were particularly scarce. However, this was overcome by using research assistants. Additionally, during the field study, there was notable lack of quantitative data, particularly statistics on agricultural and livestock production during the pre-colonial period. Respondents were unable to recall or provide figures on agro-pastoral production, although their oral accounts and demonstrations indicated that production was high. Archival sources also offered limited statistics on agricultural and livestock production within Elgeyo Marakwet District during the colonial period. This scarcity of data made a quantitative comparison and analysis of data between the pre-colonial and colonial agro-pastoral production challenging.

Moreover, at the Kenya National Archives, Nairobi, the researcher was unable to access certain crucial materials listed in the catalogue, likely due to either poor storage or carelessness in documentation procedures. Despite these challenges, the study utilized respondent’s accounts and narratives, and corroborated available archival data with the secondary data.

During the field study, some informants were suspicious and reluctant to give information on some issues, especially regarding land and cattle rustling. However, leveraging on contacts and individuals known to the informants helped to build trust, making them more willing to participate in the oral interviews. Additionally, the study faced the challenge of insecurity in some parts of Kerio Valley, particularly in Marakwet East Constituency and Marakwet West Constituency due to cattle rustling. This issue was addressed by conducting interviews via voice-calls.

1.9 Literature Review

This section presents a review of literature pertaining to ecological change and food security problem in Elgeyo Marakwet. It also outlines theoretical framework employed in this study. Literature review was done thematically in line with the study objectives, to ensure a coherent chronological flow.

1.9.1 Agro-Pastoral Economy of the People of Elgeyo Marakwet and their Ecology,1850-1895

The relationship between humans and their environment dates back to origins of humanity (Ogot, 1979; Waweru, 1992; Kizito, 1998). Thus, intricate interconnection between physical environment and human activities is of significant importance (Mwanzi, 1977; Ogot, 1979; Mazrui, 1986). Ogot (1979) asserted that reconstructing history of a specific community necessitates consideration of ecological factors such as altitude, mountains, soils, water, vegetation, temperature, and rainfall. Indeed, the relationship is such that:

> If one wishes to understand a people and its development, one must have some knowledge of its milieu, the land it lives in, and especially the climatic conditions (Lindblom, 1920).

It is therefore necessary that any comprehensive ecological study incorporates an examination of socio-economic activities, including agro-pastoral production and food security within a given environment. As Sindiga (1981) aptly puts, history should endeavor to elucidate the dialectical interplay between humans and their natural environment.

Studies conducted in Kenya, such as Matheka (1992), Waweru (1992), Kizito (1998), and Lemoosa (1998) have illustrated interactions between humans and their environment, particularly focusing on the nomadic lifestyles and socio-economic aspects of society in relation to ecology. The same trend has been predominant in the studies of Elgeyo Marakwet (Chesang, 1973; Ruttoh, 1988; Kipkorir, 1993; Chebet and Dietz, 2000; Changa'ch, 2015; Cherop, 2020). However, studies touching on interplay between agro-pastoral economy of the people of Elgeyo Marakwet and their ecology in relation to agro pastoral production and food security within their environment have not been adequately explored. Thus, this study aims to fill this knowledge gap and enhance our understanding of the problem of ecological change and food security in Elgeyo Marakwet.

A study by Awuondo (1990) on ecological sociology of the Turkana Nomads highlighted those socio-economic interactions between Turkana, their environment, and their neighbors represent a socio-ecological adaptation. Awuondo further opined that during periods of drought and famine, Turkana nomads migrated with their livestock in search of pasture and water. They also engaged in barter with the Pokot and Samburu, exchanging livestock and livestock products for grains as an adaptive strategy. Awuondo's work attempted to reconstruct the pre-colonial socio-economic history of Turkana and examined society from the lens of socio-ecological adaptation. However, findings of Awuondo's study do not address

various environmental dynamic patterns or changes that occurred in the pre-colonial period over time and space.

The current study departs from a socio-ecological approach to a historical-ecological framework to examine the impact of ecological change on agro pastoral production and food security over time and space. This is in respect to the fact that there is a dynamic symbiotic relationship between environment and humanity (Amin, 1974). It is this change in ecology and its effect on agro-pastoral production and food security that this study has attempted to bring out. Awundo's work has been particularly valuable in providing content relevant to the study of the pre-colonial societies like the Elgeyo and Marakwet with somewhat different socio-ecological background, and approached from a historical perspective. Thus, this study, benefited significantly from Awundo's findings in examining ecology in which man's activities, including agro pastoral production, take place, in Elgeyo Marakwet.

A study by Rigby (1985) provides an anthropological account of Maasai as a nomadic community, highlighting their deep attachment to large herds of livestock. Rigby characterized movement of the Maasai with their herds in search of pasture and water as disorganized. Consequently, his work tends to overlook community's understanding and mastery of their ecological context concerning livestock production and food security. In contrast, the current study challenges this imperialist perspective by historicizing interaction of the pre-colonial Elgeyo Marakwet agro-pastoral economy, particularly livestock keeping, and their ecology, to establish its contribution to food production and food security.

Cherop (2020), in examining the role of traditional knowledge on food security among Marakwet living in Arror Ward, observed that Marakwet pastoralists demonstrated a

profound understanding of their environment, including nutritional value of various grazing and browsing vegetation across different ecological zones (highlands, escarpment, and lowlands). Their pastoral activities were influenced by seasonal variations in the physical environment. Additionally, Cherop submitted that food production and preservation were organized according to traditional practices. Cherop's work, however, was confined to a limited geographical area, that is, Arror Ward in Elgeyo Marakwet County, and focused on the role of traditional knowledge in food security during the pre-colonial period. In contrast, the present study explores food security from the perspective of ecological change, and aimed to understand the historical relationship between agro-pastoral economy and ecology of Elgeyo Marakwet over time and space up to post-colonial period, as well its implications on food security. Nevertheless, Cherop's work provided valuable insights for this study in examining the pre-colonial interaction between agro pastoral economy of the people of Elgeyo Marakwet and their ecology.

In the same vein, Waweru (1992) observed that transhumance was common and represented most effective traditional way through which Samburu community utilized their marginal land for pastoral economy. Equally, Kjekshus (1977) argued that the pre-colonial man in East Africa had sound ecological knowledge, which underpinned their pastoral activities. Kjekshus further opined that pastoralist in Tanganyika had mastered their environment, as evidenced by their seasonal nomadic movements, which were an adaptive response to changes in physical environmental conditions. For example, they grazed their livestock in the lowlands during wet season and moved to the escarpments during the dry season. However, Kjekshu's study, was limited to nomadic pastoralism, with little or no attention given to cultivating pastoralists, including the Elgeyo and Marakwet. Consequently, the cultivating pastoralists have been overshadowed in pastoral studies. Therefore, current study examined

interaction of agro-pastoral economy of the people of Elgeyo Marakwet and their environment, to establish whether there were similarities in crop cultivation and grazing practices and patterns. Kjekshu's work, nonetheless provided valuable insights for this study in examining agro pastoral economy of the pre-colonial Elgeyo Marakwet in the context of the three ecological zones (Highland, Escarpment, and Kerio Valley).

A study by Kipkorir and Kareithi (2013) contended that livelihood of the Marakwet community was at risk due to environmental degradation occasioned by human activities such as over cultivation and overgrazing coupled with climatic change. These factors negatively affected irrigation furrow systems and contributed to decline in millet and sorghum cultivation. Their study was limited to examining impacts of natural and human factors on furrow irrigation systems and did not address ecological change, agro-pastoral production and food security in the area, which is the focus of this study. Despite this apparent glaring lacuna in Kipkorir and Kareithi's research, their work provided valuable data on natural and human factors in deterioration of indigenous irrigation furrows. This data was pertinent to understanding causes and effects of ecological change on indigenous irrigation and food security. Thus, this study attempted to fill this knowledge gap by providing more comprehensive analysis on the role of furrow systems and other socio-economic activities in Elgeyo Marakwet region to ecology, agro-pastoral production and food security.

Chesang (1973), in his unpublished dissertation, analyzed Superstructure of the Semi-Pastoral Keiyo and provided a historical summary of social spheres and cultural institutions of pre-colonial Keiyo. He documented intricate relationship between culture and environmental relations within Keiyo socio-economic activities, including hunting, gathering, crop cultivation, livestock keeping and raiding. Chesang noted that culture (taboos, customs, and

religion), environment, and socio-economic activities of Keiyo society are inseparable. However, his focus was limited to superstructure of Keiyo community. Despite limitations of Chesang's work, it provided a foundation for understanding ecological set-up and changes that transpired during the pre-colonial, colonial, and post-colonial epochs, and their eventual impact on agro-pastoral production and food security.

The Elgeyo and Marakwet communities economically exploited their three distinct ecological zones (Kerio valley, escarpment, and highland plateau), taking into account the challenging ecological and environmental characteristics of these zones (Ruttoh, 1988; Tarus, 1994; Chebet and Dietz, 2000; Chan'gach, 2015; Cherop, 2020). For example, grazing of livestock was basically conducted on the floor of Kerio Valley (*keu/soin*), whereas cultivation of millet and sorghum was carried out along the floodplain of the Kerio River, on the upper slopes of the Kerio Valley (*lagam/korget*) and at the foothills of the escarpment (Ruttoh, 1988; Tarus, 1994).Similarly, hunting and gathering were conducted in the open woodlands of the Kerio Valley while domestication of crops and livestock was carried out in the highland ecological zone (Cherop, 2020). Additionally, Cherop (2020) opined that food production in the area was largely influenced by altitude, soils, and climatic conditions across the three ecological zones. The works of Ruttoh, Tarus, Chan'gach, and Cherop provided valuable background and insights to this study in examining ecological interaction and its contribution to food production and food security in Elgeyo Marakwet.

Based on the reviewed literature in this sub-section, it reveals that, there is almost no in-depth studies that have been done specifically examining the interaction between agro-pastoral economy of the people of Elgeyo Marakwet and their ecology.

1.9.2 Elgeyo Marakwet Ecology and Economy during the Colonial Period, 1895 - 1963

African pre-colonial economic systems, prior to advent of colonialism, demonstrated deep undertaking of ecology, and resource management (Ogot, 1979; Sindiga, 1981; Zeleza, 1986; Ndege, 1987; Kizito, 1998; Okuro, 2002; Cokumu, 2002; Omwoyo, 2004). However, this conventional ecological wisdom and resource management were significantly undermined and distorted by onset of colonialism in Africa (Rodney, 1972; Amin, 1974; Kisaka, 2009).

Environmental historians and ecologists have extensively researched and documented changes to natural ecosystems of Africa, particularly in East Africa and Kenya, since European colonization (Harris, 1969; Kjekshus, 1977; Sindiga, 1981; Kizito, 1998; David, 2002). Ecological changes in Africa can be understood and explained in terms of ecological conditions and population trends (Ogot, 1979). However, these changes can also be historically analyzed thematically, that is, in the pre-colonial, colonial, and post-colonial periods and establish their impact on food production and food security.

Adedeji (1985), Zeleza (1986), and Harris (1975) are among scholars who have explored Africa's economic history through the lens of agricultural change and food insecurity. Their studies encompass the entire continent and are influenced by pervasive agricultural decline in Africa. Their findings and conclusions are at most tenable at regional level and do not account for specificities of different regions within Africa. These scholars assumed that changes in agricultural economy were consistent across the continent. This limitation is due to the fact that agricultural systems are regional specific. This explains why ecological change and food security can only be clearly understood within a historical background of a specific geographical area. Given their work (Adedeji, 1985; Zeleza, 1986; Harris, 1975) spans the whole of Africa, it was necessary to test their assertion by analyzing a more specific

area, like Elgeyo Marakwet County. This study, therefore, concentrated on a specific community under research. Their studies, however, enriched this research in examining ecological change and food security as a result of colonial socio-economic policies and practices in the colonial Elgeyo Marakwet.

In his work on how Europe underdeveloped Africa, Rodney (1972) discussed various themes related to development and the European-African contact between various times of history. He argued that colonialism undermined and distorted African indigenous ecological knowledge without providing viable alternatives. Rodney identified forced labour, confiscation of livestock, forceful taxation, and land alienation as mechanisms of indigenous ecological knowledge interference. These distortions subsequently caused ecological breakdown in Africa. While Rodney's work is insightful, it approached underdevelopment of Africa from underdevelopment theoretical perspective and offers a generalized overview without focusing on specific communities. To address this gap, this study narrowed its unit of focus to the Elgeyo and Marakwet communities to test Rodney’s conclusions against the background of a smaller and more localized unit, utilizing human ecology theory to analyze ecological change and food security in Elgeyo Marakwet.

In addition, Rodney’s work proved relevant to this study in the sense that it highlighted crop cultivation and livestock keeping as the most predominant land use activities in Africa, and consequently, any examination of Africans socio-economic and political relations with the outside world must consider colonial policies regarding land use and control, and their impact on ecology and food security among African communities, such as Elgeyo Marakwet. Drawing on Rodney's insights, this study analyzed various economic policies that emerged

from colonial economy and their impact on the pre-colonial ecology, agro-pastoral economy, and food security in Elgeyo Marakwet.

In the same line of thought, Brett (1979), applying under-development theory in examining relationship between colonialism and underdevelopment in East Africa, submitted that colonial economic policies hindered traditional African economies in the process of maximizing agricultural production at the expense of the East African ecology. Brett further contented that colonialism suppressed Africa's intrinsic understanding and mastery of her ecological systems. Similarly, Zeleza (1986) posited that integration of Kenyan societies into capitalist modes of production through colonial state economic policies gradually precipitated a crisis in the pre-existing African production systems.

Their studies (Brett, 1979; and Zeleza, 1986), while providing a comprehensive overview of economic development in colonial East Africa through the lens of underdevelopment theory and concept of modes of articulation. Consequently, their work does not adequately demonstrate how colonial economic policies were offensive to African ecology and how they eventually affected agro-pastoral production and food security. Nevertheless, Brett and Zeleza's work proved relevant to this study in establishing effects of colonial economic policies on ecological set up and their eventual impact on agro-pastoral production and food security among the Elgeyo Marakwet communities.

Mwanzi (1997), in his study on the History of the Kipsigis, argued that bio-physical features may not fully explain why people choose to inhabit a certain area. However, once settled, these features significantly influence a people's way of life, including their socio-economic activities. Conversely, Kipkorir (1993) and Tarus (1994) contended that geographical features

(ecological zones) more than anything else determined varying impact of colonialism on the Marakwet and Keiyo people. They noted that the people of Elgeyo Marakwet inhabited Elgeyo Marakwet escarpment due to its cool climate, defensibility, and function as a refuge from famine and colonial tax collectors. Kipkorir highlighted strategic advantage of escarpment in spotting their enemies from a distance, while Tarus provided an interesting account of how Keiyo used Elgeyo escarpment to play a game of hide and seek with tax-collectors and labour recruiters. Although these studies by Mwanzi, Kipkorir, and Tarus's were informative and insightful, they did not address how the establishment of colonial rule in Elgeyo Marakwet region affected ecology, agro pastoral production systems, and food security. The present study, therefore, filled this lacuna.

In their studies, Mazrui (1981) and Boahen (1989) argued that colonialism led to land alienation among Africa communities, including in Kenya. Deprived of their land, the foundation upon which wealth accumulation could be built, African communities experienced increased impoverishment. Findings of the present study established that Elgeyo Marakwet land upon which they had used for agro-pastoral production, was alienated during colonial period. Consequently, the Elgeyo Marakwet communities lost access rights to communal land, shrines (*kapkoros*), saltlicks grounds, and hunting and gathering areas. This disruption adversely affected various pre-colonial agro pastoral production systems and food security strategies. Therefore, works of Mazrui and Boahen significantly enriched this study.

Kanogo (1993), writing on squatters and roots of Mau Mau, noted that the publication of the Swynnerton Plan in 1954 altered the direction of land ownership and agricultural policy in general. He observed that Swynnerton Plan had a profound impact on land ownership and African agriculture in the 1950s and beyond. This plan proposed a complete overhaul of

traditional land ownership practices (Swynnerton, 1955). It recommended a survey of all high potential African-occupied land, including Central, Nyanza, and Rift Valley Provinces (Keiyo and Marakwet Districts). The plan called for fragmented holdings to be consolidated and enclosed (Swynnerton, 1955). The anticipated benefits of these reforms included provision of legal title deeds and associated security (Kanogo, 1993).

Additionally, the Swynnerton Plan highlighted that land consolidation would facilitate provision of agricultural and veterinary services to individual farmers, promote cash crop cultivation and livestock management (Swynnerton, 1955). Kanogo (1993) noted that Swynnerton plan was fully accepted and implemented immediately. Although the plan emphasized colonial government's intent to enhance African agricultural development, its primary aim was to address issues related to the land question posed by Africans (Kanogo, 1993). The Swynnerton Plan and Kanogo's work provided valuable insights to this study on colonial land policies and their impact on agro-pastoral production and food security in Elgeyo Marakwet.

A study by Kisaka (2009) on food security and coping mechanisms in marginal areas, a case of West Pokot, posits that during the colonial period, Pokot people were forcefully dislodged from their land and pushed to overcrowded and infertile reserves. In these reserves, their food production systems were significantly suppressed. Kisaka further noted that the Pokot people were compelled to work on settler plantations, neglecting their own food production. Similarly, Cokumu (2002) writing on agricultural change in Siaya between 1894 and 1945, contended that the people of Siaya had an efficient, self-sustaining, and dynamic agricultural system prior to establishment of British colonial rule. Cokumu also observed that Luo

agricultural organization was sound, rational, and grounded in Siaya people's knowledge of their environment and traditional institutions.

Cokumu further argued that during the colonial epoch, colonial state significantly influenced agriculture of Siaya by incorporating it into colonial capitalist economy. This restructuring of indigenous agriculture systems involved introduction and development of commodity production, wage labour, and expansion of markets. Cokumu concluded that due to this, Luo households in Siaya suffered insufficient labour, resulting to food shortage, and with extensive cultivation of crops for export led to soil degradation and erosion. The works of Kisaka (2009) and Cokumu (2002) analyzed impacts of colonial policies and incorporation of agriculture in different geographical settings with somehow varying ecological conditions. Despite their focus on different regions, their work provided valuable insights on colonial agricultural policies and land tenure systems, which are pertinent to the current study on the impact of colonial economic policies on ecology, agro-pastoral production, and food security in Elgeyo Marakwet.

Aseka (1989) conducted a historical analysis of the Buluyia political economy during the colonial period, examining issues such as colonial land alienation, forced taxation and forced labour in Buluyia. He demonstrated how indigenous farmers adapted to colonial capitalist modes of production and argued that ecological interference occurred through integration of colonial capitalism with the pre-capitalist modes of production. Aseka also noted that colonialists brought sophisticated technology that ensured maximum exploitation of Africans natural resources without considering long-term ecological impact or paying significant attention to ecological conservation. However, Aseka’s work does not demonstrate how colonization and introduction of sophisticated technology affected agro-pastoral production

and food security. Nonetheless, Aseka's analysis provided valuable insights for this study on how colonialism affected ecosystem, agro-pastoral production, and food security in Elgeyo Marakwet.

A study by Omwoyo (1992) submitted that massive alienation of fertile African land for white settlements and settler plantations in Gusii land was done through legislation and use of force. This process aimed to benefit settlers by providing raw materials for export and undermine indigenous food production systems. Similarly, Kisaka (2009) contended that the colonial government used racial discrimination to grant Europeans vast tracts of productive agricultural land almost for free, while pushing Africans to overcrowded reserves and less productive. Kisaka and Omwoyo further observed that Africans in reserves were deliberately impoverished to compel them to provide labour on European farms. The works of Omwoyo and Kisaka were invaluable to this study, it provided insights into the impact of colonial policies on land, ecology, agro-pastoral economy, and food security in Elgeyo Marakwet.

Tarus (1994), writing on the Keiyo of Kenya during the early colonial period, examined in detail the relation between Keiyo, settlers, and colonial administrators up to the year 1939. He argued that entrenchment of colonialism in Keiyo area had profound impact on the community. He observed that by 1905, colonial administration in Uasin Gishu had created Keiyo reserve to restrict Keiyo territorial expansion into Uasin Gishu plateau and to check free movement of people and livestock. Tarus further noted that Keiyo were not only compelled to pay taxes on sale of livestock (slaughtered cattle and goats) and livestock products (hides and skins), but also underemployed after they lost a huge portion of their favorable grazing land to European Settlers through Ewart Grogan Concession. Tarus goes on to posit that the Keiyo community, in response, actively engaged in trade, businesses, and

cash crop farming. Notably, Taru's work, in particular, covers colonial period up to year 1939, the year the Second World War began. The present study extended into post-colonial era up to year 2013 to demonstrate the significance of ecological change over time, agro-pastoral production, and food security in Elgeyo Marakwet. This approach provided a comprehensive understanding of the dynamics of Elgeyo Marakwet ecology and agro-pastoral economy, as well as how colonization affected both ecological set up and agro-pastoral economy, and eventual impact on food security.

In the same vein, Chebet and Dietz (2000) posited that despite the fact that Keiyo living in Kerio Valley did not directly suffer from land alienation, mainly because of its arid and semi-arid nature, its inhabitants still felt the impact of colonialism since the area was designated as an African reserve. Findings of Tarus, Chebet and Dietz indicated that colonial administration subjected Keiyo to land alienation, taxation, and forced labour, disrupting their pre-colonial social and economic institutions. However, their works did not adequately address the impact of colonial policies on ecology, agro-pastoral production, and food security among the Keiyo, which is the core of this study on the Elgeyo Marakwet communities. Despite this gap, works of Tarus, Chebet and Dietz proved relevant to the present study. It provided valuable data on colonial policies which guided this study in establishing its effects on ecology, agro-pastoral economy and food security.

Furthermore, Kipkemei (2020) analyzed agricultural change among the Keiyo of Elgeyo Marakwet during the colonial period. He provided a detailed historical analysis of dynamism and innovativeness of Keiyo's indigenous agriculture, highlighting its efficiency and productivity. Kipkemei further demonstrated how colonial penetration modified and marginalized Keiyo's land and indigenous agriculture. However, his work did not explore

how establishment of colonial rule transformed ecology of Elgeyo Marakwet and its eventual impact on agro-pastoral production and food security. This study hoped to fill this gap. Nevertheless, Kipkemei's work enriched and provided useful insights in examining how colonial land policies, among other policies, transformed Elgeyo Marakwet's ecology and effect it had on agro pastoral economy and food security.

Based on the reviewed literature in this sub-section, it is evident that there are almost no in-depth studies that have been done on colonial transformation of the Elgeyo Marakwet ecology and its impact on agro pastoral economy and food security in the study area. This study, therefore, attempted to fill these knowledge gaps, by analyzing colonial transformation of Elgeyo Marakwet ecology and its eventual impact on food production and food security.

1.9.3 Elgeyo-Marakwet Agro-pastoral Economy and Ecology during the Post-Colonial Period 1963- 2013

Aspects of food security cannot be fully addressed without considering government policies and legislations on ecological management, conservation, and agro-pastoral economy. The role of government policies and legislation on agro pastoral economy and food production is largely viewed in terms of formulation and implementation of policies and legislations that are likely to enhance or improve status of ecology, agro-pastoral economy and food security (Shanguhyia, 2008).

Kanyinga (1997), in his analysis of land issues among the Mijikenda, examined the introduction of land tenure policies in Kenya through Registered Title under Kenya Land Act of 1963. He posited that this policy aimed to provide title deeds to farmers to enhance their ability to access credit. This, in turn, was expected to improve farm productivity, investment

returns, and creditworthiness of landowners. Similarly, Breth (2002) expanded on the concept of land tenure security, noting that it significantly reduces incidences of land disputes and increases the demand for complementary short-term farm inputs. This observation aligns with the idea that secure land tenure encourages investment in land improvements and agricultural inputs, which can boost productivity.

Despite addressing the issue of land security tenure, these studies fell short of adequately exploring its connection to ecology, agro pastoral economy and food security, particularly in semi-arid areas like Elgeyo Marakwet, where land serves as the main productive asset driving agro pastoral economy. Nonetheless, the works of Kanyinga and Breth were instrumental in this study, in establishing that shifts from communal to private land ownership in Elgeyo Marakwet led to land fragmentation into economical unviable plots, land disputes in Kerio valley, disruption of communal grazing and livestock mobility patterns, and the promotion of maize monoculture. These transitions resulted in ecological disruptions, decreased agro-pastoral production and diminished food security.

Shanguhyia (2008) and Ochieng (1995) provide a foundational understanding of Kenya's historical economic policies and their spatial impacts. Shanguhyia noted that at independence in 1963, Kenya's new administration inherited a nation characterized by spatially uneven development, with economic policies favoring white settler community. Similarly, Ochieng (1995) highlighted that post-independence policies prioritized economic growth, channeling capital to areas deemed ripe for rapid development, particularly highlands of Kenya. Both authors highlighted concentration of investments in road infrastructure and agriculture within regions of high and medium potential, which contributed to notable economic growth.

However, their studies did not thoroughly explore the impact of these policies on ecology, agro pastoral economy and food security, a gap that this study aimed to address. Despite this limitation, their works were fundamental in understanding the historical context and policy framework that have shaped current ecological conditions and food insecurity in Kenya's ASALs, including Elgeyo Marakwet.

Keya (1991), critically examines the transition in policy frameworks governing arid and semi-arid lands in Kenya after independence. He observed that, initially, the African Land Development Program (ALDEV) instituted under the Swynnerton Plan (1954–1959) aimed to implement grazing schemes in these regions. However, this later was replaced by Range Management Division, which focused on economic transformation in ASAL areas, particularly emphasizing on livestock production. Keya, particularly highlighted the continuity of marginalization in these regions even after independence, further indicating that the post-colonial policies did not significantly improve resources allocation and attention to these areas compared to the colonial period.

While Keya's work offers a valuable overview of policy shifts, his work is somewhat generalized, focusing on national level changes without examining their specific impacts on individual communities within ASAL regions. The present study sought to fill this gap by focusing specifically on the Elgeyo Marakwet communities, providing a more nuanced understanding of these broader policy changes have impacted ecology, agro-pastoral economy, and food security, which were somewhat overlooked in Keya's broader analysis.

In the same vein Akuja and Kandagor (2019) and Hinderlink and Sterkenberg (1987) submit that formulation and application of Sessional Paper No. 10 of 1965 reflected a deliberate

policy effort by the independent Kenyan government to prioritize development of more productive regions. This approach aimed at accelerating national economic development but resulted to the neglect of ASAL areas. Consequently, government policies disproportionately benefited large farms, export crops and high potential areas, exacerbating inequalities and stalling economic development of ASAL areas. Furthermore, this focus on economically productive regions and the neglect of lowland agro pastoral based economies created deep inequalities in human development that are evident in Kenya today.

However, while these studies offer valuable critiques of the broader economic and policy impacts, they do not explore the specific consequences of Sessional Paper No. 10 of 1965 on particular ASAL communities, such as Elgeyo Marakwet. The current study builds on these works to addresses this critical gap by providing a detailed analysis of how this policy has specifically affected the Elgeyo Marakwet's ecology, agro-pastoral economy, and food security.

Fratkin (2001), examines the transition in East African Pastoralism, highlighting the efforts of international agencies and non-governmental agencies such as the World Bank (WB), International Labor Organization (ILO), and United States Agency for International Development (USAID), to enhance livestock production through initiatives like group ranges, commercial ranches, and grazing blocks. Similarly, Hardin's (1968) critiques these efforts through his concept of the ''tragedy of the commons'', arguing that such interventions often led to policies that favored private landowners, which he believed would be more effective for resource conservation and management.

Both Fratkin (2001) and Hardin's (1968) conclude that most of these non-governmental initiatives and policies failed due to factors such as ecological challenges, lack of sustained donor support, and lack of "ownership" from the pastoral communities. Although these studies provide valuable insights into the limitations and challenges of non-governmental interventions, they do not specifically address the impacts of these initiatives on ecology, agro-pastoral economy, and food security of particular communities, such as Elgeyo Marakwet. This study builds upon the findings of Fratkin and Hardin's work, providing a targeted analysis of how these non-governmental initiatives, implemented within the framework of government policies and legislations, affected the Elgeyo Marakwet's ecology, agro-pastoral economy, and food security.

In 1979, Moi's administration formulated ASAL policy aimed to fostering economic development in these regions (Omiti& Irungu, 2002). This policy led to the implementation of various agro-based projects, funded by non-governmental organizations in a number of ASAL districts in Kenya (GOK, 1981). However, Omiti and Irungu (2002) writing on institution and policy issues relevant to pastoral development in Kenya, critique the policy for its lack of community input from ASAL areas and its emphasis on technical issues, such as land degradation and irrigation, rather than on pastoral development projects. Their study also highlighted attempts to resettle pastoralists into irrigation schemes and group ranches under this policy to achieve sustained development in these areas.

In the same vein, Bates (2005) analyzed the impacts of droughts and food crises in Kenya in 1979–80. He argued that food shortages were not simply an inevitable result of insufficient rainfall, instead, transition from drought to famine, mediated by public institutions through government and non-governmental policy formulation. Bates contends that well-designed

policies can mitigate the adverse effects of drought on food security. The works of Omiti and Irungu, and Bate identify notable gaps in the 1979 ASAL policy, including its broad and general approach and failure to address the specific needs of ASAL communities like Elgeyo Marakwet. Despite these shortcomings, their analyses provided essential background and insights for the current study, which aimed to examine the impact of government policies and legislations on ecology, agro-pastoral production, and food security in Elgeyo Marakwet County.

Kenya's National Food Policy, as articulated in Sessional Paper No. 4 of 1981, provides a critical historical and analytical framework for understanding the evolution of food security strategies in the country (GOK, 1981). This Policy was drafted in response to significant food shortages experienced in 1980, marking a pivotal moment in Kenya's approach to addressing food security (GOK, 1981). According to Shanguhyia (2008) and Kisaka (2009), the formulation of this policy was triggered by the need for a comprehensive review of food policies, which, up until 1981, were integrated into broader agriculture policies. Shanguhyia and Kisaka further assert that the 1981 policy reflects the pre-liberalization era which were marked by stringent government control in areas of food production, marketing, agricultural inputs, research and extension services. However, this policy did not specifically address the unique needs of individual communities or geographical regions within Kenya. This omission is particularly pertinent considering the distinct circumstances of communities like the Elgeyo Marakwet, whose agro-pastoral economy and food security strategies differ from those in other parts of the country.

While the 1981 policy provides a critical framework for understanding the evolution of food security in Kenya, its one-size-fits-all approach failed to account for the diverse needs of

different ecological zones and communities, such as those in the ASAL regions. This broad generalization underscores the limitations of national food policies and highlights the necessity for tailored strategies to specific local contexts, which could significantly affect food production and security in regions like Elgeyo Marakwet County.

Similarly, Sessional Paper No. 1 of 1986 on Economic Management for Renewed Growth continued to emphasize self-sufficiency in major food staples like maize, beans, rice, and milk, while paying little attention to traditional crops such as millet, sorghum, and cassava (GOK, 1986). This focus on grains, particularly maize and rice, reflected a broader government policy trend that prioritized these crops at the expense of other essential food sources, further marginalizing traditional crops that are better suited to the varied ecological conditions across Kenya. Shanguhyia (2008) argues that the 1986 policy perpetuated colonial agricultural strategies, which prioritized expanding maize production for both export and subsistence, thereby neglecting the importance of traditional food crops like millet and sorghum. This continuity had several significant consequences, including exacerbating challenges in food production and access to critical support services, such as extension services, credit facilities, farm input subsidies, and physical infrastructure.

This study aimed to address these gaps by shedding light on the ecological impacts of favouring certain crops over others and their implications on ecological sustainability, agro-pastoral production, and food security in Elgeyo Marakwet. By focusing on the specific needs of the Elgeyo Marakwet community, this study underscores the importance of tailored strategies that consider the unique ecological and socio-economic contexts of different regions. This approach contributes to a more nuanced understanding of the complex factors influencing ecological change and food security in Elgeyo Marakwet, Kenya.

In view of rapid population growth, increasing demand for food production and food security, and the need to industrialize, Kenya's National Food Policy of 1981 was reviewed in 1994 with the formulation of Sessional Paper No. 2 of 1994 (GOK, 1994). This revision aimed to not only promote food production but also to promote a market economy (Shanguhyia, 2008). Given the identified gaps in this policy document, it is imperative to examine crop production policies in the post-colonial period to ascertain their influence on ecology, agro-pastoral production, and food security. Thus, this study is undertaken in Elgeyo Marakwet to ascertain the effect of this policy on ecology, agro pastoral economy and food security up to 2013. The 1981 and 1994 food policies provided a foundational framework for analyzing the impacts of government policies and legislations on ecology, agro-pastoral production and food security.

In the same vein, Kyalo (2008) and Wambua (2008) submit that, in Kenya, problems of food security are exacerbated by a policy bias towards cash crops as opposed to smallholder food crop production. Chronic food insecurity remains a major challenge in Kenya, particularly in ASALs (Kisaka, 2009; Cherop, 2019). This prompted the 2002 government under President Mwai Kibaki to review the 1994 policy once again (Omiti& Irungu, 2002; Shanguhyia, 2008). The impact of 1994 policy on local ecology and agro-pastoral economy remains underexplored. To address this knowledge gap, this study attempted to establish how policy biases towards cash crops has affected smallholder food crop production, influenced land use, biodiversity and environmental sustainability for agro-pastoral production and food security in Elgeyo Marakwet. Moreover, the 2002 national food policies attempted to address food insecurity in ASAL areas. Though insightful, the 2002 national food policies provided generalized view of ASAL areas with no attention to the specific experiences of any particular community. Thus, this study attempted to fill this gap.

Agaki (2022), writing on President Mwai Kibaki's policies that revitalized Kenya's food security, noted that structural adjustment policies of the 1980s and 1990s not only destroyed agricultural sector in Kenya and Africa but also aggravated food insecurity. Agaki noted that in 2002, the National Rainfall Coalition (NARC) government reviewed some of government's food policies to directly address needs of communities living in marginal areas (Shanguhyia, 2008; Kisaka, 2009). These policies included the Strategy for Revitalizing Agriculture (2002–2004), National Policy for the Sustainable Development of Arid and Semiarid Lands of Kenya, Ministry of Livestock and Fisheries Development Strategic Plan (2003–2007), and Kenya Rural Development Strategy 2002–2015 (Shanguhyia, 2008; Agaki, 2022). These policies tackled a wide range of issues affecting communities, including poverty, education, health, infrastructure, and general economic development. The insights from the work of Agaki and Shanguhyia were instrumental in providing a comprehensive analysis of how government policies, particularly during President Mwai Kibaki's tenure, influenced ecology, agro-pastoral economy, and food security in Elgeyo Marakwet.

Furthermore, in 2006, Kibaki’s government drafted the National Food and Nutrition Policy (GOK, 2006). This Policy outlined strategies for addressing specific issues that afflict Kenyans, such as poverty and food security, and aimed to rectify the shortcomings of previous government food policies (GOK, 2006). The policy was necessitated by severe food shortages experiencing in many parts of the country during President Kibaki’s regime (GOK, 2006). The National Food and Nutrition Policy was designed to address these challenges and secure the country’s food supply. The 2006 policy offered valuable insights into the effects of national policies on the Elgeyo Marakwet’s ecology, agro-pastoral economy and food security. By examining these impacts, this study sheds light on the effectiveness of

government interventions in enhancing food security and sustaining agro-pastoral economy in Elgeyo Marakwet, while also considering their ecological implications.

In 2008, the government of Kenya launched Vision 2030, the country's' development blueprint, covering the period from 2008 to 2030 (GOK, 2008; Shanguhyia, 2008; Mwita, 2013). The Vision 2030 was based on three key pillars: economic, aimed at maintaining a sustained growth of 10% per annum over17 years; social, to create a just and cohesive society enjoying equitable social development in a clean and secure environment; and political, to establish an issue-based, people-centered, result-oriented, and accountable demographic political system (Shanguhyia, 2008; Mwita, 2013).

On the economic pillar, Vision 2030 identified the agriculture sector as a key driver of the economy to sustainably achieve economic growth and boost food security (GOK, 2008). This goal was to be achieved through land reclamation for irrigation, enhancing capacity, building resilience and responses to climate change among communities in reclaimed areas, and reducing competition and waste of natural resources (GOK, 2008). By integrating these perspectives, this study not only critiques the effectiveness of Vision 2030 in addressing local food security but also provides a nuanced understanding of how past and present policies have shaped the ecological and economic landscape of the Elgeyo Marakwet region.

Kenya Vision 2030 emphasized local food production as a means to alleviate household food insecurity (GOK, 2008). However, according to Bolo and Nkirote (2012), the implementation of Vision 2030 faced numerous challenges, such as inadequate and limited resource allocation for development activities. Political interference, corruption, poor policy linkage, and the global recession further limited donor funding, highlighting the country's dependency on

external aid. Despite these challenges, the Vision 2030 development blueprint policy document provided valuable insights for this study in examining how it has influenced ecology, agro-pastoral economy, and food security in Elgeyo Marakwet.

Anderson (2003), while writing on politics of ecology in Baringo, Kenya, opined that the financial success of the shamba system (forest farming) in India provided impetus for colonial conservation strategies to implement the same policy in Kenya. His study concluded that shamba system was successfully applied in colonial Kenya. However, the policy failed to stand the test of time in most forests in post-colonial Kenya (Kangombe & Gitomba, 2008; Ageki, 2016; Limo, 2016). This failure was attributed to forest plundering associated with the shamba system (Oyugu, 2022).

Sinange (2012) further asserts that in the post-colonial Kenya, the Mau Forest lost huge chunks of its forest cover due to excision for human settlement especially the Ogiek community. However, corruption led to widespread encroachment, further disrupting tree establishment. Retrospectively, Elgeyo Marakwet's forest land, especially the Kaptagat and Kapchemutwa forests, lost significant portions due to illegal logging concessions, encroachment, and the uprooting and disturbance of tree seedlings under shamba system arrangement (Limo, 2016).

The present study draws on historical parallels, such as those analysed by Anderson (2003); Kangombe & Gitomba (2008); Ageki (2016): Limo (2016) and Oyugu (2022), which examined the success of the shamba systems during the colonial era in Kenya and its subsequent failure in the post-colonial period due to forest plundering and encroachment. By focusing on the challenges specific to the shamba system in Elgeyo Marakwet, this study

highlights the broader ecological effects in the region, including loss of biodiversity, disruption of the water cycle, and degradation of soil quality. Furthermore, the study links these ecological changes to the decline in agro-pastoral economy, which has adversely affected food security. The study also offers insights into how policy mismanagement and environmental degradation can undermine local food systems and livelihoods.

1.10 Theoretical Framework

Human and environmental relationships have many possible values, including, among others, food acquisition and production, sustainability, senses of place, spirituality, and communion with nonhumans (Kizito, 1998). Examining change in human-environment relationships requires an interdisciplinary perspective. Ecological change and food security entail complex relations. The study was guided by human ecology theory, which arose out of multiple disciplines (biology, anthropology, geology, history, ecology, and sociology), all of which examine some aspect of interactions between humans and various environments (Young, 1974). The most influential figure and proponent in the development of human ecology theory was Amos H. Hawley (1986). He stipulated that all aspects of humans and environment are interrelated and dependent on each other and thus require a holistic view. Emphasis is placed on creation, use, and management of resources for creative adaptation, human development, and sustainability of environments. Human ecology theory emerged in early 1900s as scientists struggled to make sense of the impact of humans on man-made and natural environments as well as on socio-economic systems of humans (Hawley, 1986).

Human ecology theory is a methodology or framework for studying human activities and social institutions in conjunction with functioning of the physical environment (Hawley, 1986). It deals with the study of human-environment relationships (Young, 1974). Marten

(2001) discussed human ecology theory as a tool for resolving issues of sustainable development and environmental problems by understanding human social-economic systems and their physical environment.

Ecological concepts can be used to study the history of human groups and societies to explain their interactions with their physical environments in the past (Campbell, 1985). Thus, this theory inquiries into human interaction with physical environment over time, emphasizing the active role nature plays in influencing human affairs and how human activities influence the environment. Using human ecology theory, Ogot (1979) postulates that African ecology studied from a historical perspective should deal with the story of man's effort to adapt to his environment and his environment to himself. Ogot further argued that historians should venture into and explore field of ecology, and ecological history must be focused on man, the historian-actor. In the same version, Kizito (1998) demonstrated that the primary factor in ecological control situations is people.

Sindiga (1981), using human ecology theory, noted that there is a symbiotic relationship between nature and humanity and observed that, as much as physical environment limits human action, human creativity is important in overcoming such limits. Similarly, Hopkins (1973) and Waweru (1992) noted that physical environment has not been a rigid factor that cannot be modified and thus has not entirely limited man's socio-economic activities. This theory elevates humanity above other organisms because man has a high ability to change the physical environment for his survival (Jacobs, 1965; Waweru, 1992).

Moreover, Waweru (1992) posits that a study that analyses ecology and man's activities has to contend with two very important but also conflicting issues: first, physical environments

within which historical actions take place, including man's activities, and second, role that man plays in modifying environment for his benefit in relation to food acquisition. Any theoretical formulation ignoring roles that the two factors play would be inadequate (Waweru, 1992).

In the same version, Milton (1996) classified human ecology interrelationships into three components. First, human beings adapt to their local environment. Second, after adapting to their environment, they influence environment to meet their needs. Third, both man and environment influence each other. Similarly, United Nations (1992) also asserts that indigenous people and their cultures are closely integrated with their local environment and both influence each other. Griggs et al. (2013) bluntly describe ecology as Earth's life support system. In this study, human ecology theory is specifically used to describe relationship between agro pastoral economy of the people of Elgeyo Marakwet and their natural environment, as well as their influence on food security in the pre-colonial, colonial, and post-colonial epochs.

It is important to underscore that the main strength of human ecology theory is interdependence; both human beings and environment depend on each other, which leads to cooperative existence of both sides. Additionally, excessive pressure on environmental system by human systems when exploiting environmental resources interferes with equilibrium balance between human activities and the environment. The main weakness of this theory is that sometimes it is too static, not adequately accounting for dynamic and rapidly changing nature of human-environment interactions in contemporary societies. This static perspective may fail to capture rapid and dynamic changes in human-environment interactions, such as those caused by technological advancement, climate change and

globalization. This weakness, notwithstanding, this study engaged knowledgeable local communities and other stakeholders such as ecological experts in the research. Their knowledge provided insights into local ecological dynamics and enhanced relevance and effectiveness of human-ecology theory.

Indeed, there exists interdependency or a relationship between agropastoralism and environment in which agro pastoral economy thrives in Elgeyo Marakwet. Two views on this topic exist in context of ecological change, agro pastoral economy, and food security. One, there has been disruption of not only crop production but also the pre-colonial ecological set-up due to economic policies introduced in Elgeyo Marakwet by both the colonial and post-colonial administrations. The other is that pastoralism is inextricably caught in cycle of cattle accumulation, cattle rustling, environmental degradation, and food shortages. This has led to ecological and agro-pastoral economic disruption and, thus, food insecurity.

Human ecology theory, therefore, provided a robust historical framework through which deep-time human ecosystem functioning was tested. It helped in analysis of data that was attained regarding this study, and in linking ecology, agro-pastoral economy and food security in the pre-colonial, colonial, and post-colonial periods up to 2013 in Elgeyo Marakwet. As used in this study, ecology, agro-pastoral economy and food security are linked. There is interdependency between human beings, their economic activities and environment. The study findings revealed relevance of this theory, as seen in summary and conclusion of this study.

1.11 Research Methodology

This section examined methodological aspects of the study, including research design, study area, target population, population sample size, sampling techniques, research instrument validity and reliability, data collection procedure, methods of data collection, data recording, data analysis, and ethical considerations that were adhered to in conducting this research.

1.11.1 Research Design

This study employed a historical research design based on qualitative techniques. The design was suitable for this study as it ensured a thorough examination and interpretation of historical sources. Sources encompassed oral testimonies, secondary sources, and archive records. In addition, the researcher utilized two non-probabilities sampling techniques, namely purposive and snowballing, to ensure a comprehensive comprehension of the phenomenon being studied. This involved selecting and interviewing individuals who possessed extensive historical knowledge regarding ecological change and food security in Elgeyo Marakwet County. The design was deemed suitable for the study as it allowed the researcher to get information from a sizable population through key informant interviews and focus group discussions while qualitatively processing and analyzing the collected data.

1.11.2 Study Area

The research was carried out in Elgeyo Marakwet County, as indicated in Figure 1, Figure 2, and Figure 3. According to Government of Kenya (GOK, 2013), 55% of the people in Elgeyo Marakwet County experience food insecurity. Ministry of Agriculture, Livestock, and Fisheries reports that 30% of children under the age of five in the area die as a result of chronic malnutrition (MoALF, 2017). A majority (78%) of households in Elgeyo Marakwet generate income through agricultural activities such as crop cultivation and livestock rearing.

Although crop production contributes to 66% of revenue for households in the County, a significant portion of county's population, specifically 73.3%, experiences food insecurity.

Additionally, poverty levels in the county are high, with 57% of the population living in poverty, compared to the national average of 46% (GOK, 2013). The ecological conditions such as heavy rainfall, high temperatures, and droughts in the county are responsible for decreasing crop and livestock outputs, causing a major impact (GOK, 2013; MoALF, 2017).

Elgeyo Marakwet County is one of the counties in the former Rift Valley province. The area officially became a county after the promulgation of the 2010 constitution (GOK, 2013). Much as it was not yet a county by the year 1850, for the sake of clarity and coherence, we shall refer to it as a county due to its current status and for purposes of the current study. The county derives its name from its inhabitants, who are the Elgeyo and Marakwet (GOK, 2013), and is arid and semi-arid area in Kenya. The county is the former Elgeyo/Marakwet District in the former Rift Valley province. The district was created in 1927, and it was split into Marakwet and Keiyo Districts in 1994 (Chebet and Dietz, 2000).

In 2010, the two districts were joined again to form Elgeyo Marakwet County after the promulgation of the 2010 constitution (GOK, 2013). Historically, the area has been inhabited by two major interrelated communities, Elgeyo and Marakwet, who are agro-pastoralists. They are part of the larger ethnic grouping of eight culturally and linguistically related ethnic groups known as the Kalenjin (Kipkorir, 1973). According to Elgeyo-Marakwet County Integrated Development Plan 2013–2017, Elgeyo Marakwet County covers an area of 3049.7 sq. km. It is 0.4% of the total area of the Republic of Kenya, most of which is arid and semi-arid (GOK, 2013). It extends from latitude 0o 20′ to 1o 30′ to the north and longitude 35o 0′

to 35o 45′ to the east. It borders West Pokot County to the north, Baringo County to the east, Trans Nzoia County to the northwest, and Uasin Gishu County to the west (see Figure 2).

Administratively, the County is divided into four sub-counties, namely: Marakwet East, comprising Embobut/Embolot, Endo, Kapyego, and Sambirir wards; Marakwet West, comprising Lelan, Sengwer, Cherang'any/Cheborорwa, Moiben/Kuserwo, Kapsowar, and Arror wards; Keiyo South, whose wards are Kaptarakwa, Chepkorio, Soy North, Soy South, Kabiemit, and Metkei; and Keiyo North, which has Kamariny, Emsoo, Tambach, and Kapchemutwa wards. In total, the County has twenty wards; six in both Marakwet West and Keiyo South and four in Marakwet East and Keiyo North (GOK, 2013; see figures 2 and 3). Iten Town, in Keiyo North Sub-County, is the current headquarters of Elgeyo Marakwet County (GOK, 2013).

The County is unique by virtue of the great amount of ecological diversity that exists in the area. The county is characterized by three distinct ecological zones that run parallel to each other in a north-south direction (see Figure 2). These are highland (*mosop*) to the west, escarpment (hanging valley/*lagam/korget*) and lowlands (Kerio Valley/*keu/soin*) to the east. There is a marked variation in amount of rainfall in the three zones. The Highland ecological zone receives between 1200mm and 1700mm per year, while the Escarpment ecological zone receives rainfall ranging from 1000mm to 1400mm per year. Kerio Valley receives rainfall ranging from 500mm to 700mm annually (GOK, 2013).

The long rains usually fall between April and July every year, while short rains fall between October and November (Cherop, 2019). The season, December to March, is the hottest period in the area with very limited amount of rainfall (Chebet, 2010). The temperatures in the

highlands have a low of 18°C during the rainy season and a high of 22°C during the dry season, whereas on the escarpment and Kerio Valley, temperatures can be as high as 30°C during the dry season and as low as 25°C during the rainy season. In terms of altitude, the highland plateau rises from an altitude of 2700 meters above sea level on the Metkei Ridges in the south to 3350 meters above sea level on the Cherangany Hills to the north. The land then falls into a series of steep slopes and flat plateaus that comprise the escarpment, thereafter culminating in Kerio Valley, averaging between 900 and 1000 meters above sea level (GOK, 2013). The escarpment forms a natural boundary between Kerio Valley and highland plateau (see figure 2).

The highland ecological zone constitutes 49 percent of the county's area and is densely populated due to its endowment with fertile soils and reliable rainfall. Escarpment ecological zone is 11 percent of the total land area, while Kerio Valley ecological zone is 40 percent of the total land area, which is semi-arid (GOK, 2013). Soils at the Kerio valley floor are mainly alluviums, which range from being moderately to extremely deep. Besides that, Kerio Valley floor soils are well drained, friable, and of high fertility, making them suitable for crop cultivation (Cappon, 1986). On the escarpment, soils are scanty and shallow, mainly coarse gravel and stony, and are of medium natural fertility (Ruttoh, 1988). The soils of Elgeyo Marakwet highland plateau are loamy, fertile, well-drained, and of good texture, suitable for livestock and crop production (Changa'ch, 2015).

Vegetation in Kerio Valley is mainly acacia and shrubs, with very poor ground cover. However, at the moment, natural vegetation cover of Kerio valley floor can be referred to as consisting of shrubs, and sparse thorny bushes, which have arisen mainly due to agricultural activities of mankind. The escarpment is covered by tropical natural forests and shrub

vegetation, while highland ecological zone is made up of bamboo forests (Tarus, 1994). It is also important to underscore that apart from indigenous vegetation, there are exotic plants, particularly cypress in highland ecological zone, and jacaranda being the dominant tree in Kerio Valley ecological zone.

Major rivers in the county include Kerio, Moiben, Chepkaitit, Sabor, Torok, Chesegon, Mong, Kapkure, Perese, Charar, Torok, Moiben, Kessup, Emsoo, Chesegon, Embomon, Embobut, Arror, and Kimwarer (GOK, 2013). Kerio River, flowing north to Lake Turkana, forms a natural boundary between Elgeyo Marakwet County and Baringo County (Tarus, 1994). There are also hills in the study area, for example, Cherangany, Kipkunurr, Koisungur, Kapteber, and Mount Sergoit (GOK, 2013).

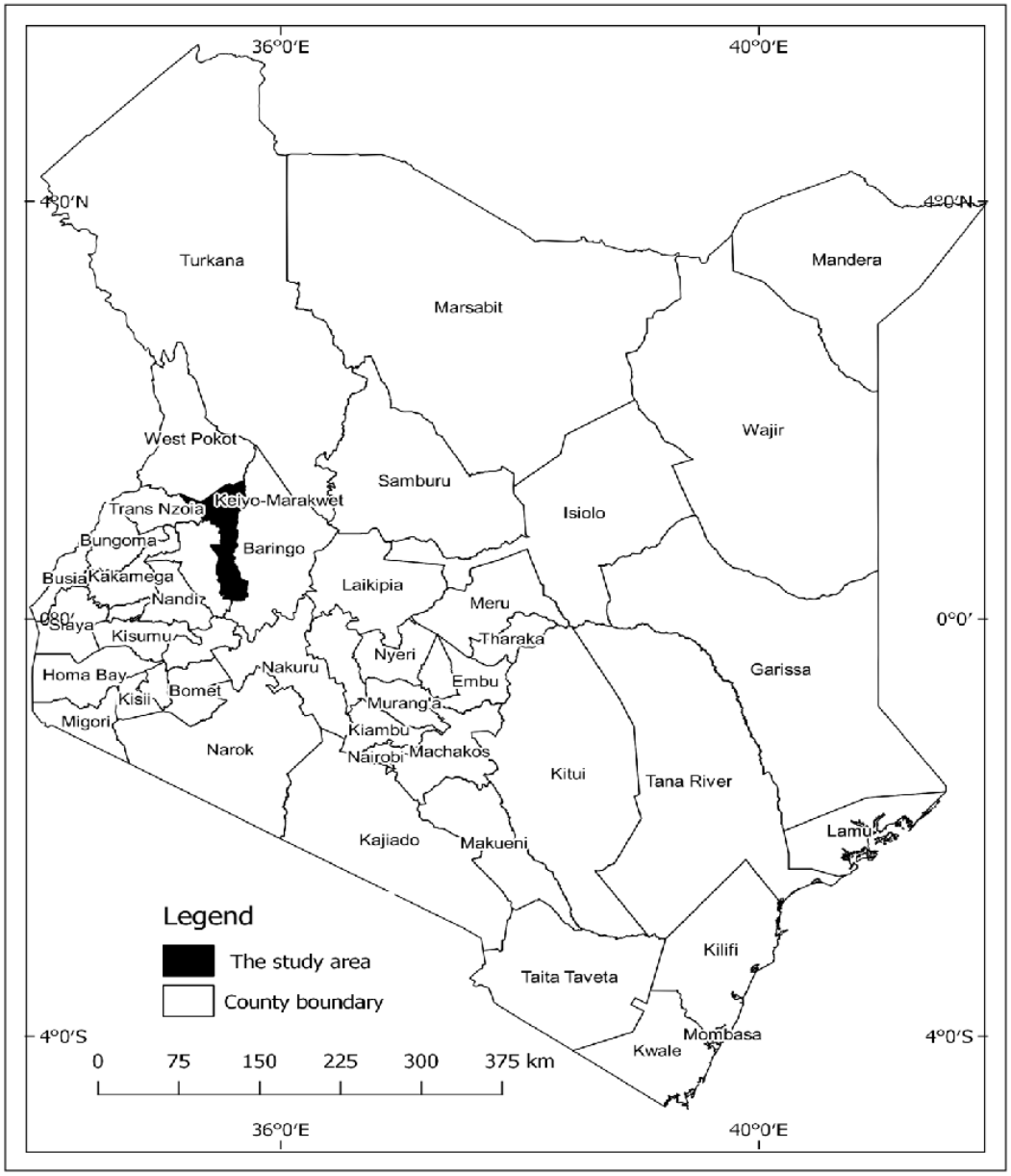

Figure 1.1: Location of Elgeyo Marakwet County in Kenya

Source: Moi University Geography & Environmental Studies Department GIS Lab (2022).

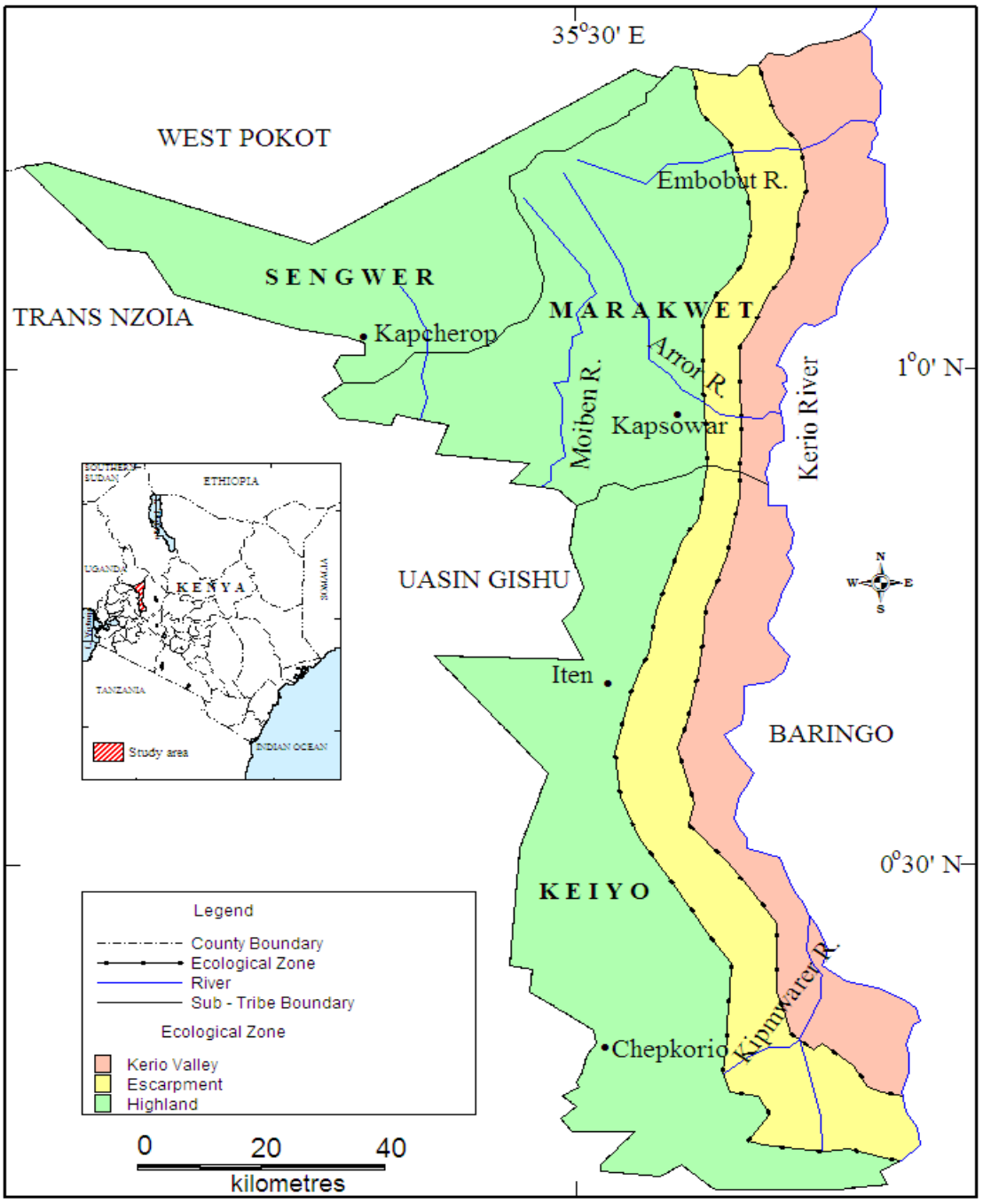

Figure 1.2: Agro-pastoral Ecological Zones of Elgeyo Marakwet County

Source: Researcher, 2022.

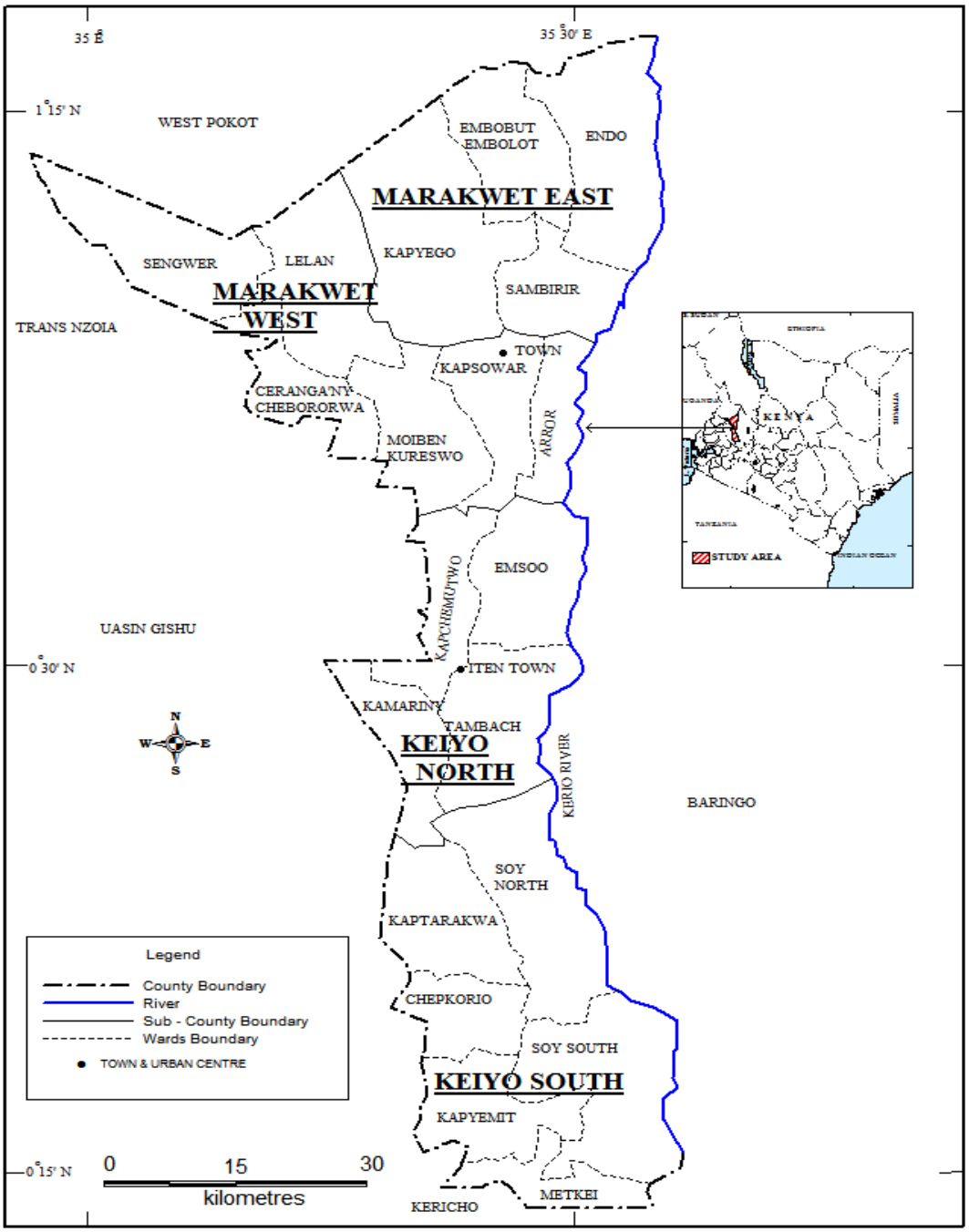

Figure 1.3: Administrative Areas in Elgeyo Marakwet County

Source: Researcher, 2022.

1.11.3 Study Population

In this study, 2009 census data was used, considering that the end point of the research extended to 2013. According to 2009 census report, Elgeyo Marakwet had a population of

369,998 people. Study population, therefore, was drawn from 369,998 people of Elgeyo Marakwet. Out of this population, youth were 159, 068, and adults were 110, 732. Approximately, youth were about 42.992% of the total population, and adults were 29.928%. Most of this population depends on agro-pastoral economy for their livelihood (GOK, 2013). The study population consisted of clan elders (men and women) of ages 65–100 years, ex-colonial administrators and headmen, post-colonial administrators (chiefs and assistant chiefs), retired forest workers, retired KVDA workers, and farmers who were residents of Elgeyo Marakwet and who may have experienced ecological change and food insecurity in the pre-colonial, colonial, and post-colonial periods. Others included ecological experts, foresters, KVDA officials, and officers in the Department of Agriculture and Irrigation in Elgeyo Marakwet County.

1.11.4 Sampling Techniques

Collection of oral data in this study involved use of snow balling sampling technique. This is a sampling technique where some informants refer the researcher or the researcher assistant to other knowledgeable resource persons (Kothari, 2004). Using this technique, the researcher was able to identify knowledgeable individuals who had relevant information on the study themes and sub-themes in Elgeyo Marakwet. Using this technique, with help of local administrators, the researcher was introduced to some of the respondents, and those interviewed by the researcher in turn were able to recommend others. Thus, the researcher was able to identify and reach out to ex-colonial administrators, clan elders, both men and women, retired forest workers, retired KVDA workers, retired government officials, especially those who worked in the ministry of agriculture and livestock, and farmers (livestock keepers and crop cultivators) as respondents through snow-balling sampling technique.

Purposive sampling technique was also utilized in this study. Ecological expert, forester, agricultural officers in the department of agriculture and livestock in Elgeyo Marakwet County and KVDA officials were purposely sampled to provide information on ecological change and food security in the study area. These sampled units were chosen purposively because they had particular characteristics, which enabled detailed exploration and understanding of themes and sub-themes of this study. Therefore, they were instrumental in this study in so far as ecological change and food security are concerned.

Furthermore, this work being historical, age bracket of key informants, especially elders, both men and women, was also considered by the researcher. Informants of age 65 to 100 years were purposively sampled. This age bracket was purposively chosen because the researcher was interested in people who were engaged in agro pastoral production and had, therefore, witnessed most of the ecological and agro pastoral production transformation that had taken place. They may have also interacted directly or indirectly (with their relatives) with Europeans during colonial times in the study area. Therefore, they had first-hand information as eye witnesses, and also second-hand information from the accounts of their relatives or clan members who interacted with Europeans during their lifetime. Therefore, sampled groups were custodians of the most relevant and reliable information to the study. The researcher limited the age of the key informants (elders) to 100 years because, beyond this age, coherence is usually a problem.

A total of 64 key informants were interviewed by the end of the study. The researcher settled on the number interviewed after respondents began being repetitive, which was an indication

that they did not have any new information to offer. Thus, data saturation. Collection of data was undertaken personally by the researcher with the help of three trained research assistants.

1.11.5 Population Sample Size

Miller (2012) posits that a sample size of 6-70 respondents is valid and reliable data depending on the research scope, research financial resources, and participants having high level of relevant information to the topic under study. Thus, a sample size of 64 respondents for this study was supported by Miller (2012). Age, gender and command of historical knowledge on ecological change and food security were relied upon as a guide to the research. The 64 informants interviewed were elders of age 65-100 years which included both men and women.

This study was guided by the concept of data saturation (Morse, 2000). This was an interview-based historical study. Therefore, concept of data saturation, as recommended by Morse (2000), was used. The recommended sample size to achieve data saturation is reached when all the information being sought by the researcher begins to be repetitive. This implies that it is unlikely that conducting more interviews will reveal new information (Miller, 2012). And at this point, the researcher uses the interviewed respondents to constitute the population sample size for the study. Thus, during the study, data reached saturation at 64^{th} interview, and therefore only 64 informants were interviewed.

1.11.6 Data Collection Procedure

A permit that authorized data collection was obtained from relevant authorities. Ethical clearance was sought from Jaramogi Oginga Odinga University of Science and Technology Ethics and Review Committee (JOOUST ERC) (see Appendix 8). This facilitated issuance of

a permit from National Commission of Science, Technology, and Innovation (NACOSTI), authorizing the researcher to carry out research in Elgeyo Marakwet County (see Appendix 7).

Using authorized research permits, the researcher then proceeded to conduct library research in Moi University's Margaret Thatcher library, Jaramogi Oginga Odinga University's library, Forest Department in Elgeyo Marakwet County, Department of Agriculture, Livestock, Fisheries and Irrigation in Elgeyo Marakwet County, and Kenya National Library in Eldoret and Kabarnet. Thereafter, he visited Kenya National Archives in Nairobi to collect Archival data.

Finally, before going to the field to collect oral data, the researcher enlisted support of under-graduate university students from the study area to assist in collecting data in the expansive area of Elgeyo Marakwet. The research assistants were taking history at the university and, thus, were grounded in oral traditions as a source of historical information. The researcher therefore trained three research assistants by engaging them through rehearsal sessions on question-posing skills, probing skills, seeking clarification skills, and how to summarize a lengthy response into short summaries through note taking to avoid information overload.

The researcher also engaged three research assistants on research etiquette, such as introducing themselves to respondents and clearly stating the purpose of the study, so as to create a good rapport with the informants before commencing interviews on the objectives of the study.

Each trained research assistant was given a letter of introduction (see Appendix 2), copies of clearance permit (see Appendix 8 and Appendix 9), a consent form (see Appendix 3 and Appendix 4), and a letter of authorization (see Appendix 7) before they were set out to the field to conduct the research. In the process of collecting field data, the researcher also closely monitored the collection of data by the research assistants. The main purpose of involving research assistants in this study was to save on time and finances by not having to conduct research over lengthy durations and traverse the three ecological zones and the difficult terrain of Elgeyo Marakwet county, thereby incurring huge expenses and taking much time.

1.11.7 Primary Data Collection

The study utilized both primary and secondary data.

1.11.7.1 Archival Data

Primary sources included archival research and oral interviews. Primary data collection was conducted between January 2022 and December 2022. The researcher obtained archival data from Kenya National Archives, Nairobi. A wide range of colonial files on Elgeyo Marakwet were examined. These documents included colonial proceedings, intelligence reports and political records annual reports, minutes and correspondences on matters such as agriculture, livestock, labour, land, and taxation, and a few Uasin Gishu District annual reports and Baringo District annual reports.

These archival data yielded information on colonial government policies, which helped this study examine impacts of colonial policies on ecology and agro-pastoral economy of the people of Elgeyo Marakwet. However, it is important to point out that archival material could not be entirely relied upon, for most of it was ridden with prejudice, bias and represented

official and personal views of those who documented it. This notwithstanding, gathered archival information was corroborated with other sources of data, especially findings from oral research. Additionally, archival information obtained from archival materials enhanced oral discussions with respondents during oral interviews and helped in tracing the chronology of events in relation to ecological change and food security.

1.11.7.2 Key Informant Interviews

The study interviewed twenty-eight (28) key informants from Marakwet community and thirty-six (36) from Keiyo community. The study used key informant interview guide (see Appendix 3) that contained a checklist of open-ended questions generated from study objectives to interview ex-colonial administrators, post-colonial administrators (chiefs and assistant chiefs), clan elders, both men and women, retired forest workers, retired KVDA workers, retired government officials, especially those who worked in the Ministry of Agriculture and Livestock, farmers (livestock keepers and crop cultivators), KVDA officials, forester, ecological expert, and agricultural officers in the Department of Livestock, Fisheries and Irrigation in Elgeyo Marakwet County.

The study engaged three trained research assistants; each had a smartphone that was used to audio record field interviews. The research assistants were guided by use of key informant interview guide, which contained a checklist of open-ended questions generated from the study objectives.

All the key informant interview participants were identified with the help of local administrators, and subsequently, the researcher relied mostly on the oral information obtained from each of the people interviewed in the field about who next was an expert on

what he was researching. In this way, the researcher built up a list of key informants, which included both men and women. Before conducting key informant interviews, the researcher booked appointments with informants one or two days prior to the interviews. Key informant interviews were mostly conducted at individual informant homes, and some were done at shopping centres. On the day of interviewing the key informants, the researcher first introduced himself and stated purpose of the study to the individual informant before commencing the interviews. During the semi-structured interview sessions, note-taking and voice recording were used simultaneously.

Key informant interviews were conducted using Keiyo language and Marakwet language with elders, farmers, ex-colonial administrators, post-colonial chiefs, and assistant chiefs. English and Kiswahili languages were used to interview KVDA officials, agricultural officers in the department of agriculture, livestock, fisheries and irrigation in Elgeyo Marakwet County, forester, and ecological expert. Orodho (2003) posits that many people are willing to communicate orally rather than in writing, and they would provide more data from respondents than using a questionnaire since it gives them freedom to express themselves freely in their own language.

Key informants were extensively interviewed in areas in which they possessed knowledge, especially on ecology, agro-pastoral production, and food security from the pre-colonial, colonial, and post-colonial periods in the study area. Interviewed persons (chiefs and assistant chiefs, clan elders both men and women, retired forest workers, retired KVDA workers, retired government officials, especially those who worked in the ministry of agriculture and livestock, and farmers) provided vital information in tracing the history of ecological change

and its impact on agro pastoral production and food security in the pre-colonial, colonial, and post-colonial periods in Elgeyo Marakwet.

Interviewed KVDA officials and agricultural officers provided insightful information on new farming methods and techniques introduced by post-colonial government through various government agricultural and food security policies and legislations and their impact on agro-pastoral production and food security. KVDA also provided information on ecological conservation, irrigation schemes in Kerio Valley ecological zone, and effects of cattle rustling on ecology, agro-pastoral programmes and food security in the study area.

Ex-administrators, who worked under colonial government towards end of colonial rule, were instrumental in providing information on colonial economic policies introduced in the study area and their effects on ecology, agro-pastoral production, and food security in colonial Elgeyo Marakwet. They also provided information on post-colonial government as regards ecology, agro pastoral economy and food security.

Forester was interviewed and provided significant information in tracing the history of *shamba system* agriculture in Kenya, specifically in Elgeyo Marakwet, and its impact on ecology, agro-pastoral production, and food security.

Ecological expert in Elgeyo Marakwet County was interviewed and provided essential information on ecological change or weather patterns and their effects on agro-pastoral productions and food security.

Key informant interviews were very valuable in this study. The researcher was able to get in-depth and detailed information on interaction between agro pastoral economy of the people of Elgeyo Marakwet, their ecology, and their local perceptions. The impact of various aspects of colonial and post-colonial policies and legislations on ecology, agro-pastoral production, and food security. Thus, key informant interviews helped in tracing the history of ecological change and food security in Elgeyo Marakwet up to 2013.

1.11.7.3 Focus Group Discussions (FGDs)

The study used five Focus Group Discussions (FGDs). FGD guide (see Appendix 4) that contained a checklist of open-ended questions generated from the study objectives. Each FGD consisted of between 6 and 12 participants. According to Kruger (2002), this gives each individual an opportunity to share insights and observations on the themes and sub-themes under study. FGDs were organized and formed considering historical knowledge, gender, and age. The researcher held FGDs with both men and women of age between 65 and 100 years. All FGD participants were mobilized and identified with the help of local administrators.

Before conducting FGDs, the researcher booked appointments with informants two or three days prior to group interviews/discussions. During the day of group interviews/discussions, selected informants were brought together into one area (mostly shopping centres) and subjected to questioning on aspects of the study themes and sub-themes in order to listen to their responses and how they reacted to each other's contributions. However, before commencing group interviews/discussions, the researcher first introduced himself and co-moderator and stated the purpose of the study to the group informants.

FGDs were organized in a semi-circle formation; participant chairs were arranged in a semi-circle, ensuring that participants had a clear line of sight to each other. Moderator's chair was placed at the open end of the semi-circle, facing the participants. This allowed the moderator to have a clear view of all participants, observe reactions, control flow of conversation, and ensure that everyone had an opportunity to speak, fostering a balanced and inclusive discussion. It also helped maintain control, manage group dynamics, and guide discussions towards research objectives.

FGDs were conducted with a broad range of representation within Elgeyo and Marakwet communities, which enabled triangulation of findings and incorporation of a wide range of perspectives. FGDs revealed divergent opinions on some aspects of the study objectives. In this situation, the researcher sought clarification by asking or probing questions to obtain consensus over contentious issues. This increased validity and reliability of the information gathered. Thus, the FGDs were suitable in obtaining several varied perspectives and in-depth information about ecological change, agro-pastoral production, and food security from men and women in groups in the study area that were used to triangulate the findings. At the end of oral data collection through key informant interviews and Focus Group Discussions, a total of 64 respondents were interviewed.

Table 1.1: Information on Oral sources

Type of Interview	Composition	Tool	Number Interviewed
Key informant Interviews	Farmers, clan elders (men and women), forester, ecological expert, local administrators, KVDA officials, retired KVDA and Forest workers	Key informant Interviews Guide	24
Focus Group Discussions (FGDs)	Men and women of age between 65 and 100 years	Focus Group Discussion Guide	40
Totals			**64**

1.11.7.4 Direct Observation

In the field study, the researcher systematically observed, photographed and recorded storage facilities, the traditional granary (see Figure 2.1), soil erosion, forest degradation, landslides and decayed irrigation furrows in the study area (see Appendix 6). According to Kothari (2001), observation method is allowed as long as it is systematically planned, recorded, and related to the study. Its main advantage is that subjective bias is eliminated if observation is made accurately. However, it should be subjected to checks and controls on validity and reliability. The researcher corroborated the observation data with oral and secondary sources. This method supplemented information obtained from oral and secondary sources.

1.11.8 Secondary Data Collection

The researcher obtained secondary data through library research by visiting Moi University Margaret Thatcher library, Masinde Muliro university library, Jaramogi Oginga Odinga

University Library, Forest Department in Elgeyo Marakwet County, Department of Agriculture, Livestock, Fisheries and Irrigation in Elgeyo Marakwet County, and Kenya National Libraries in Eldoret and Kabarnet. Library materials in form of theses and dissertations, seminar/conference papers, books, journals, government and non-government reports, and plans constituted some of the secondary sources that were examined.

1.11.9 Instruments of Data Collection

These are research tools or devices used in collection of data (Kothari and Guarav, 2015). The researcher used key informant interview guides, focus group discussion guides, and observation guides to collect oral data in the field. Key informant interview guide (see Appendix 3) was used in interviewing ex-colonial administrators and headmen, post-colonial chiefs and assistant chiefs, retired forest workers, retired KVDA workers, retired employees of ministry of agriculture and livestock, farmers (crop and livestock keepers), elders (both men and women), KVDA officials, ecological experts, foresters, and agricultural officers in Elgeyo Marakwet County.

Key informant interview guides contained a checklist of research questions generated from the three study objectives seeking to obtain information that addresses the study objectives. This tool was significant to this study in obtaining information from people who possessed vast knowledge on ecological change, agro-pastoral economy, and food security in the pre-colonial, colonial, and post-colonial Elgeyo Marakwet. The tool, therefore, enabled this study to get a wide range of information that covered all aspects of the study. Focus group discussion guide (see Appendix 4) was used to facilitate discussions with selected informants in FGDs.

The researcher, while using these research instruments (Key Informant Interview Guide and Focus Group Discussion Guide), was not bound to strictly follow the question guideline, nor did he make his respondents aware that he had a question guideline. This approach gave the researcher room for probing questions as the individual oral interviews or group interviews/discussions progressed. It also allowed informant to delve into issues that he or she did not anticipate. This turned out to be very imperative and enriched this study.

Additionally, the researcher, while interviewing respondents, used a digital voice recorder with permission of the participants. The use of a digital voice recorder provided the researcher with an opportunity to concentrate on interviewing respondents and focus on their answers and prompts rather than taking notes.

An observation guide (see Appendix 5) was used to facilitate collection of data on storage facilities, soil erosion, forest degradation, landslides, and decayed irrigation furrows to supplement information obtained from oral and secondary sources. The guide contained a checklist of research questions seeking to obtain information that addresses the study objectives. This tool was significant to this study in obtaining information on indicators of ecological change and its effect on agro pastoral production and food security.

1.11.10 Content Validity

A research instrument's validity is defined as degree to which it measures constructs for which it was intended (Robson, 2011). For this reason, research instruments must accurately measure concepts being studied in order to ensure results' veracity (Pallant 2011). To ensure content validity, supervisors reviewed study instruments and made adjustments based on agreed-upon suggestions. This ensured completeness of its evidence. On the other hand,

validity of secondary data was ensured by reviewing article contents, examining evidence espoused in books and page domain extension for internet sources.

In order to ensure content validity, research instruments contained adequate set of items on objectives of the study because the more the questions represent the objectives of the study, the greater the content validity (Creswell, 2014). Content validity of the questions was therefore determined by supervisors' judgment. They clarified questions that were confusing or obscured and discarded questions that were ineffective and non-functional.

1.11.11 Research Reliability

Mugenda and Mugenda (1999) define reliability as the “measure of degree to which a research instrument yields consistent results or data after repeated trials.” In order to become acquainted with the study area, reconnaissance was conducted in this study area. This made it possible to identify credible informants for this study. It also helped in applying appropriate language for interview in particular areas. The researchers used Test-Retest method, which entailed administering the identical instrument to subsets of the same community's respondents twice.

The administration of instruments for the first time was done in January 2022, and the second time was done after one month (February 2022), so subjects were unable to remember how they responded the first time they completed the instrument. The period of one month was not so long that the knowledge of the respondents about material being examined had changed. The reliability was therefore established by correlation of responses between the two instruments. The results were consistent with responses from selected individuals.

1.11.12 Data Recording

Secondary data and archival data were recorded through note-making. Primary data that was obtained through key informant interviews and FGDs in the field was tape-recorded using a digital voice recorder with permission of the participants. The use of a digital voice recorder enabled the researcher to focus on participants, their answers, and prompts. Oral data was also recorded through note-taking, however, on a limited scale. The digital voice recorder was also used to store oral data.

1.11.13 Data Analysis

At the end of the research, a lot of information had been gathered from key informant interviews, archival sources, and library research. Key informant interviews that were tape-recorded using a digital voice recorder with permission of the participants and conducted in the Keiyo and Marakwet languages were recorded, transcribed, and translated into English.

Archival data were subjected to internal and external scrutiny, where they were authenticated and validated. They were then analyzed through content analysis in phases whereby data were coded into themes and sub-themes of the study. Both archival and oral data were corroborated with secondary sources of information that were also analyzed through content analysis in line with human ecology theoretical tenets.

Triangulation was also done to ascertain consistency of the study findings. This was aided by various sources of data that emanated from archival sources, oral sources, and library research. Together with the research assistants, oral data was transcribed and translated to minimize loss of context and arrive at common interpretation of findings from the interviews.

The findings and conclusions of this study have been presented according to the research questions.

1.11.14 Ethical Consideration in Research

In this study, researcher ensured that participation was voluntary, thus, principle of free and informed consent was adhered to by emphasizing voluntarism. The researcher also assured the respondents that information obtained from them would be confidential and would be used for academic purposes only. With this assurance, respondents developed confidence in answering research questions. The information that was obtained from individual respondent was also treated confidentially.

The researcher booked appointments with informants prior to conducting interviews with them. They were also informed that the purpose of the study was academic. Similarly, written consent (see Appendices 3 and 4) was obtained from interviewee(s) before proceeding with interviews. All respondents were treated with respect, and personal questions were not asked. In addition, research assistants were trained on ethical issues relating to this study. Finally, other ethical considerations included acknowledgement of informants and various archival and secondary sources used in this study.

1.11.15 Organization of the Study

This study has been divided into five chapters. Chapter one encompasses background information to the study, literature review, and methodology employed in undertaking the study. Chapter two covers interaction between agro-pastoral economy of the people of Elgeyo Marakwet and their ecology. Establishment of colonial rule and its influence on Elgeyo Marakwet ecology, agro-pastoral economy, and food security is covered in Chapter

three. Chapter four analyzed post-colonial government policies and legislations and how they have shaped ecology and agro-pastoral economy of Elgeyo Marakwet between 1963 and 2013. The study finally concluded with Chapter five, which presents summary, conclusions, and recommendations of the study.

1.11.16 Summary

This chapter has provided background to the study, particularly statement of the problem, objectives of the study, research questions, research assumptions, justification and significance of the study, scope, limitation and delimitation of the study, literature review and applicable theoretical framework. This chapter has also presented research design, study area, target population, sampling techniques, research instruments, research validity, research reliability, data collection procedure, data collection, data recording, data analysis, and ethical considerations. Finally, it has detailed the structure and organization of the study.

CHAPTER TWO
ELGEYO MARAKWET AGRO-PASTORAL ECONOMY AND ECOLOGY 1850-1895

2.1 Introduction

This chapter traces origin, migration, and settlement of the people of Elgeyo Marakwet and the place of their agro-pastoral economy. It also analyses interaction of Elgeyo Marakwet agro-pastoral economy and their ecology during the pre-colonial period. The chapter argues that the pre-colonial Elgeyo Marakwet economy was characterized by finger millet and sorghum cultivation, traditional food storage, furrow irrigation farming, hunting and gathering activities, barter trading activities, environmental conservation measures, livestock keeping, and food preservation. These economic activities were deeply embedded in their mastery of ecology, which significantly contributed to ecological management, agro-pastoral economy and food security.

2.2 Origin, Migration and Settlement of the People of Elgeyo Marakwet

Human migration refers to the movement of people from one place to another with the intention of settling temporarily or permanently in a new area (Osuga et al., 2020). It is hypothesized that migrations began with Homo Erectu's departure from Africa into Eurasia approximately 1.75 million years ago. Subsequent significant population movements include Neolithic Revolution, Indo-European expansion, Early Medieval Great Migrations, and Turkic expansion (Groenveld, 2016; Osuga et al., 2020). Similarly, historical records dating back to the 1st century documents migrations and settlements of Cushites, Bantu, and Nilotes in Africa, and occurring around the same time (Gugliotta, 2008; Ogot, 1967).

These groups were established in or near their present settlements towards mid-17th century AD (Ochieng, 1975). From this perspective, European anthropologists and later Kenyan historians have shown keen interest in tracing origins of human migration from various regions of Africa into East Africa, and particularly into Kenya. Their primary research methodologies have been historical linguistics, archaeology, and oral traditions (Kipkorir, 1973; Tarus, 1994; Ochieng, 1975; Ogot, 1967). For example, it is recorded that Nilotic migrations took place from northern Africa to West African to East African regions and further to the Far East (Osuga *et. al.*, 2020).

The Elgeyo and Marakwet ethnic groups are integral parts of the larger Kalenjin ethnic group of Nilotic origin. Their pre-colonial origins, migrations, and settlements are closely intertwined, and cannot be divorced wholly from those of the Kalenjin, who belong to the Southern Nilotic lineage (Ehret, 1971; Sutton, 1973; Chesang, 1973; Kipkorir, 1973; Tarus,1994; Chebet and Dietz, 2000). Linguistic evidence suggests that Kalenjin are descended from Southern Nilotic-speaking communities whose original homeland was located at the confluence of the Bahr-El-Ghazal River and the Nile in Southern Sudan (Ehret, 1971).

The Kalenjin community kept domestic stock and possibly cultivated sorghum and finger millet. They lived in proximity to an Eastern Cushitic speaking community with whom they had significant cultural interaction (Ehret, 1971). This led to borrowing of the culture of livestock keeping. The general location of this cultural exchange was somewhere near the common border between Sudan, Uganda, Kenya, and Ethiopia (Kipkorir, 1973). This corresponds to various historical narratives from the Kalenjin sub-tribes, including the Elgeyo and Marakwet, which identify Mt. Elgon (*Tulwop Kony*) as their original point of settlement

in Kenya. Distefano (1985) concurs with this perspective, suggesting that Nilotic population migrated into western highlands of Kenya near the corridor between Mt. Elgon and Cherangany hills. Similarly, Matson (1957) indicates that the Kalenjin temporarily resided in Mt. Elgon area, where it appears there was a considerable amount of wandering within the concentration area before some groups, such as Sabaot, settled permanently, while others migrated to their present locations.

Existing oral tradition points out that the Kalenjin community, including the Elgeyo and Marakwet people, originated from *Misri* (Egypt). Similarly, Kipkorir (1973) asserts that certain clans in Marakwet claim to have migrated from *Misri.* The present study, through key informant interviews with Talai and Sogom clans in Marakwet, found consensus that their ancestral homeland was *Misri*, with Mt. Elgon serving as the dispersal point to the current settlements. Likewise, many Elgeyo key informant interviews noted that various Keiyo clans such as Irong, Mutei, Marichor, and Metkei at some point in their history, they lived at *Tulwop Kony* (Mt. Elgon) (Kipkosgei, O.I., 2022; Katam, O.I., 2022).

Furthermore, Tarus (1994) concurs that the Kalenjin, including the Keiyo and the Marakwet, migrated from *Misri*, moved to Sudan, and eventually settled at Mt. Elgon (*Tulwop Kony*) for an extended period. According to Matson (1957) and Kipkorir (1973), these migrations were driven by factors such as war, famine, diseases, or search for better grazing habitats. Consequently, several historical narratives from various Kalenjin sub-tribes identify Mt. Elgon as their original point of settlement in Kenya **(**Huntingford, 1953; Kipkorir & Welbourn, 2008).

Supporting this, Chebet and Dietz (2000) observed that oral tradition of the Keiyo and other Kalenjin speakers, including Marakwet, trace their ancestry to one forefather called *Kale* who settled around *Tulwop Kony.* This point of origin features prominently in most narratives recorded after colonial period. Ochieng (1975) posits that Pokot were the first community to break away from Mt. Elgon, followed by other Kalenjin speakers, including the Elgeyo and Marakwet. Similarly, Tarus (1994) and Matson (1957) note that after staying at *Tulwop Kony* for some time, Elgeyo and other Kalenjin speakers were forced to migrate due population pressure and drought.

Matson (1957) posits that between fifteenth and sixteenth centuries, groups of Kalenjin-speaking people left Mt. Elgon area. Clan elders from the Elgeyo and Marakwet communities acknowledge that their people have historically have been migratory. A significant group moved southward, establishing themselves in the Kerio Valley and around Lake Baringo. Corroborating this, Ochardson (1971) argues that their settlement area was probably situated to the north of present-day Baringo and Elgeyo Marakwet, and not far from Lake Camos (Baringo).

Tarus (1994) also mentions that oral tradition of Keiyo points to Riwo in West Pokot as their area of origin. They recount that some of the clans who settled at Riwo came from *Misri*. Similarly, Marakwet clans trace their origins to Riwo in West Pokot before moving to their present settlement in Kerio Valley (Cherwon, O.I., 2022). This suggests that Pokot who first broke away from Mt. Elgon, as mentioned by Ochieng (1975), might have been followed by Keiyo and Marakwet to Riwo in West Pokot. Tarus (1994) points out that Pokot at Riwo may have pushed Keiyo southwards towards Lake Baringo.

Key informant interviews indicate that around Lake. Baringo, Elgeyo/Keiyo encountered Tugen and Marakwet (Cheboi, O.I., 2022). Tarus (1994) argues that from here, Keiyo, Marakwet, and Tugen attempted to follow their predecessors, Nandi and Kipsigis, who had previously migrated southwards. Upon discovering that Nandi and Kipsigis had already settled at Sageri Hills, Keiyo, Marakwet, and Tugen sought alternative areas. Ochardson (1971) also posits that Keiyo were left behind around Lake Baringo by Nandi and Kipsigis, who were fleeing from drought and famine. Supporting this, Kipkorir (1973) asserts that Keiyo and Marakwet are composed of remnant groups that fled various calamities.

Kipkorir (1973) further argued that when the first European explorers arrived in Rift valley, all Kalenjin group were located and lived within the Kerio valley around Lake Baringo, spoke related languages with different dialects, and shared similar customs. This suggests that prior to their migration into the present settlements, the Kalenjin people constituted a single large complex (Kipkorir, 1973; Moore, 1986). This is also evidenced by shared clans or clan names, customs, and age sets that cut across the Kalenjin sub-groups. From Lake Baringo, the Marakwet followed Kerio River northwards to their present settlement. The Tugen remained around Lake Baringo, finding refuge in the surrounding hills, Elgeyo/Keiyo moved further south, crossing the Kerio River into their current settlement (Tarus, 1994).

Key informant interviews revealed that Keiyo and Marakwet settled close to Lake Baringo and Kerio River to access water for their livestock (Sigira, O.I., 2022). In addition, Elgeyo and Marakwet chose well-sheltered terrain on Elgeyo-Marakwet escarpment ledge for security reasons. According to key informant interviews, the community migrated with their livestock and employed scouts, known as *Segeik* to survey new areas before migration. These

scouts ensured that the area was safe from enemies. They would light fires on hills at night to signal that they had identified habitable land.

In nineteenth century, the Keiyo and Marakwet had evolved into agro-pastoralists, engaging in both livestock keeping and crop cultivation (Chesang, 1973; Kipkorir, 1993; Chesang and Dietz, 2000). Chesang (1973), Tarus (1994), and Cherop (2020) argue that the three ecological zones of Kerio Valley (*Keu/Soin*), Escarpment (*lagam/korget*) and Highland (*mosop*) were well suited to Keiyo and Marakwet's agro-pastoral economy, as well as their hunting, and gathering activities. These zones provided essential resources and food sources. Additionally, their settlement in Kerio valley and the escarpment was influenced by numerous streams from Elgeyo Marakwet Escarpment, which offered a reliable source of water for irrigation and their livestock (Ruttoh, 1988; Tarus, 1994; Cherop, 2019). Therefore, agro pastoral economy and concerns for food security appear to have guided their close contact with their environment, particularly Elgeyo Marakwet escarpment and Kerio valley area around Lake Baringo and along River Kerio.

2.3 Land Tenure System

Land tenure system refers to ways in which rights to land are held, encompassing rights, restrictions, and responsibilities related to land ownership and use, which are critical factors in agricultural production (Esese, 1990; Dale and McLaughlin, 1999; Karigi, 2015). Historically, land has been humanity's ecological habitat. Prior to European colonialism, land ownership as private property was rare among communities in Africa, including in Kenya (Aseka, 1989; Cokumu, 2002; Omwoyo, 2004). Elgeyo and Marakwet were no exception. Angara (2010) contends that land is central to most African societies, being integral to social, political and economic life. It was the most valued property, serving as a permanent resource

and primary source of food for both people and livestock (Karigi, 2015). Consequently, all economic pursuits aimed at securing food were centered on natural environment, particularly land (Kizito, 1998; Chebet and Dietz, 2000; Cherop, 2020).

According to available oral evidence, by as early as 1800 AD, the people of Elgeyo Marakwet had developed sophisticated land tenure system with well-defined regulations regarding ownership, control, and usage (Kipkorir, 1973; Chesang, 1973; Ruttoh, 1988; Chebet and Dietz, 2000). For the Elgeyo and Marakwet, land was largely considered communal property, both livestock grazing and crop cultivation were not restricted. Ownership and accessibility to land were vested in the whole community (Chebet and Dietz, 2000; Kipkorir & Kareithi, 2013). Thus, land tenure system in the pre-colonial Elgeyo Marakwet can be characterized as communal.

Land rights were collectively and equally enjoyed (Chebet and Dietz, 2000; Kipkorir & Kareithi, 2013). Clan elders allocated land based on societal needs; for example, land temporary vacated after harvesting (*roret*) was reverted back to communal use for livestock grazing. Rivers (*ainet*), areas designated to which all stock was given access for watering, hills (*tulwo*) and Kerio Valley floor (*keu/soin*) were considered communal grazing lands. This arrangement served not only ecological conservation purposes but also ensured continuous availability of grazing and water resources for livestock, thus promoting livestock economy and food security.

Forest areas were set aside for circumcision and seclusion (*kaptarus*), sacred places (*Kapkoros*) were reserved for communal sacrifice places, and salt licks (*Kapn'geny*) were allocated and protected for communal use. These areas were used collectively by the

community and could not be privately owned. This system was implemented to ensure ecological conservation and support food production through livestock keeping and crop cultivation (Mulwo, O.I., 2022; Kipchoge, O.I., 2022). In many African communities, land, viewed as a means of food production, was regarded as a fundamental entity and social glue that unified people and facilitated their relationships (Mbiti, 1969). Thus, land control in many African societies was instrumental in shaping social and economic activities of any community, including crop and livestock production (Maloba, 1993).

The Elgeyo and Marakwet clans owned strips of land, running from Kerio Valley ecological zone up the escarpment into highland ecological zone (Cherwon, O.I., 2022). These strips of land were utilized for agricultural cultivation and livestock herding (Kipkorir, 1993; Tarus, 1994; Chebet and Dietz, 2000). Typically, these tracts of land were delineated by a row of stones or specific type of vegetation (Chesang, 1973; Kipkorir, 1993; Tarus, 1994; Chebet and Dietz, 2000). In some instances, boundaries were marked by physical features such as streams, rivers, large trees, and hills (Tuitoek, O.I., 2022). This demarcation provided permanent boundaries for clan land (Cherop, 2020).

This subdivision of land facilitated families and individuals to carry out livestock keeping and crop cultivation (Chebet and Dietz, 2000). In instances of inter-clan boundary disputes, all male clan members were required to contribute *Kipketin* (traditional beer made from honey), goats, and food as a fee to the elders who served as arbitrators (Kenneth, O. I., 2022). However, a FGD with clan elders held at Tambach shopping centre in the year 2022 revealed that disputes over land boundaries were relatively uncommon in the pre-colonial Elgeyo Marakwet, as land was plentiful for agro-pastoral production.

Possession of multiple land by various clans of Elgeyo and Marakwet across different environmental and ecological zones (highland, escarpment, and Kerio valley) was aimed at avoiding food shortages through agro-pastoral production in these diverse areas (Komen, O.I., 022). This fragmented land strategy safeguarded Elgeyo Marakwet community against crop failure in one ecological zone by compensating for it in another. Notably, pre-colonial community did not view land as a resource for private possession (Kipkorir, 1973). Thus, no man was landless, as each man belonged to a clan. This land tenure system ensured that every member of the community had access to land for agro-pastoral production, thereby securing food supply.

The Elgeyo and Marakwet land use was structured around three core concepts; methods of acquiring land, rights over that land, and economic utilization (Kipkorir, 1973; Chesang, 1973; Tarus, 1994). Land ownership among the Elgeyo Marakwet was dictated by customs, with clan elders responsible for apportioning land to each male member (Kipkorir, 1973; Tarus, 1994). Traditionally, men owned land through inheritance or by clearing unclaimed land (Tarus, 1994). According to key informant interviews, land could also be acquired through hunting; when a man killed an animal, he could claim land around where the animal fell and was skinned, provided that it had not been previously claimed (Chelan ’ga, O. I., 2022).

The first man to strike the animal was given priority (Cheserek, O.I., 2022). Additionally, man could claim virgin land by burning a virgin bush, marking the boundary of a *shamba*, or fixing boundary stones (*oiywek/koik ab mbar/mbaret*) around a portion of the burned virgin land (Chesang, 1973; Chebet and Dietz, 2000). Oral interviews with Elgeyo and Marakwet

clan elders revealed a consensus that, upon acquiring land, everything in it, including vegetation, belonged to him or the owner (Komen, O.I., 2022).

Land as a factor of production, has been exploited for various activities such as livestock keeping, hunting, gathering, and crop cultivation (Kizito, 1998; Cherop, 2020). Esese (1990) succinctly states that land is a crucial resource around which other economic activities, including crop cultivation, livestock rearing, labour and organization of production, revolve. Similarly, among the Elgeyo Marakwet, land has been exploited for agro pastoral production and food security.

Based on the discussions, it is evident that agro pastoral production among the pre-colonial Elgeyo Marakwet community was closely tied to ecology and natural environment. Land was allocated based on community's needs, demonstrating their mastery and understanding of local ecology. This approach ensured ecological conservation and sustainable management of communal land for agro pastoral activities, thus, enhancing food security within the community.

2.4 Indigenous Weather Forecasting

Indigenous communities across Africa have traditionally relied on their traditional ecological knowledge to inform their interactions with their environment and natural resources (Berkes 2009). This encompasses a wide range of technologies, knowledge, skills, practices, and beliefs (Gakuru, 2006). This knowledge has accumulated over generations of people inhabiting specific environments. Importantly, this knowledge remains preserved among indigenous or local communities in many parts of Africa (UNEP, 2006).

Similarly, the people of Elgeyo and Marakwet, like other African communities, developed extensive indigenous knowledge systems about their environment. By observing weather change, they prepared for planting to ensure good crop yields. They possessed ecological knowledge and skills regarding when and how to harvest food crops, as well as indigenous methods for storing and preserving harvested food crops to ensure a steady supply for their families. The practice of indigenous weather forecasting is ingrained in many cultures and has been developed through long years of habitation and observation (Gakuru, 2006; Berkes, 2009; Lolemtumet *et al.*, 2020).

Different communities and cultures utilize biotic indicators and celestial bodies to predict future weather conditions (Changa et al., 2010; Musembi and Cheruiyot, 2016). Among the Elgeyo and Marakwet, weather forecasting involved observation of celestial bodies, plants, and animal behaviors. Revered elders were known for their expertise in the movement of stars. For instance, oral interview with a clan elder noted six stars known as *Kakiployet*, which moved in the following order: *Kirgip Kogel* (male/brightest star in the east), *Korgoop kogel* (wife), *werit* (son), and *chepto* (daughter). Changes in this order indicated upcoming changes in seasons (Chepkon'ga, O. I., 2022). Similarly, a FGD held at Arror shopping centre with clan elders in the year 2022 noted that when the two stars, *Kirgip Kogel* and *Korgoop Kogel,* are far apart, it signifies an impending drought, while their proximity indicates onset of rain. These stars were typically observed in the sky at 4 a.m. (Sigira, O.I., 2022).

Additionally, oral interview with a farmer, a key informant highlighted that appearance of dark-grey clouds concentrating on the entire eastern horizon of Elgeyo Marakwet area indicated that rain would likely occur within a few hours or days (Chelan 'ga, O.I., 2022). Conversely, absence of certain black clouds signaled failure of rain and, consequently, a

prolonged drought (Kenneth, O.I., 2022). Among the Elgeyo and Marakwet, a full moon is generally associated with low chances of rainfall, whereas a new moon surrounded by a rainbow-like colour indicates that rain will likely occur within one or two weeks (Chepkon'ga, O.I., 2022).

An FGD session with clan elders at Chebiemit shopping centre in the year 2022 revealed that position and color of new moon were used to predict rainfall. Specifically, a pale brown new moon indicated likelihood of rain within that month. However, a very bright new moon showed dry spell. Additionally, if crescent's horn was facing upwards, it was believed to signify retention of water, while a down-facing crescent indicated release of water in the coming days (Cherono, O.I, 2022; Kop Maiyo, O.I, 2022).

In Kerio Valley ecological zone, key informant interviews averred that migration of elephants out of Rimoi Game Reserve towards Lake Turkana was interpreted as an escape from incoming drought. Their return and subsequent enjoyment of good pasture signaled imminent rainfall, prompting people to start planting their crops (Cheserek, O.I, 2022). Similarly, movements of flocks of birds such as sparrows (*chebiswa/kibiswet)*, crowned hornbills (*Chepkilti*), and butterflies (*taburbur*) in groups, as well as the appearances of many red ants (*birech*) were also seen as indicators of impending rain (Kop Maiyo, O. I, 2022).

The month of March (*Kiptamo*) was traditionally associated with presence of large numbers of guinea fowls (*targaken*) and cry of crowned hornbill (*chepkilti*), signaling planting season for the people of Elgeyo Marakwet (Koech, O.I, 2022). Additionally, migration of certain birds' species is associated to seasonal changes in temperatures and rainfall (Koistinen, 2002). The indigenous knowledge regarding emergence of ants from the soil correlates with

scientific understanding that ants come out of hibernation when daily temperatures are sufficiently warm (Koistinen, 2002).

In the pre-colonial Elgeyo Marakwet, strong winds blowing towards east were considered an indication of high chances of rainfall, and winds blowing towards west signaled potential natural calamities such as drought (Chepkon'ga, O.I, 2022). An FGD session with clan elders at Kaptagat shopping centre in the year 2022 submitted that when cows, especially calves, exhibited lively behavior in grazing field or on their way home in the evening, it was interpreted as a sign of imminent rain. Farmers were thus advised to prepare their agricultural fields for planting. Scientifically, cow calves are sensitive to low pressure systems, high humidity and temperature changes (Zuma *et al.,* 2013). Thus, Elgeyo Marakwet farmers used these observations as indications to ready their land for anticipated rains.

Furthermore, the people of Elgeyo Marakwet used plant characteristics to predict weather conditions. For example, shedding leaves by plants such as *kokorwo* (*Evryytherina Abbysinica*), Sesia (acacia trees), and *tuyunwo* (*Balanites agyptiaca*) were an indication of commencement of a dry season. Conversely, emergence of new leaves towards the end of the dry season, indicated imminent arrival of long rains (Cheruiyot, O.I., 2022). Similarly, flowering of *tepengwo* (Vernonia auriculifera) was associated with onset of rains, typically preceded by shedding of leaves (Cherop, 2020).

The people of Elgeyo Marakwet also predicted weather patterns by examining goat intestines (*beritabmo*). During special ceremonies, especially rites of passage for their children, elders would select a goat to be slaughtered, and its intestines would be 'read' and interpreted (Cherwon, O.I., 2022). This cultural practice helped in forecasting weather and preparing for

potential disasters. For example, if the intestines indicated a looming famine, the community would be advised to stock food or prepare to go to *kapkoros* to appease god of rain (Cherop, 2020).

An FGD session conducted at Kabulwo shopping centre in the year 2022 revealed that to predict weather conditions, the rumen and intestines of a slaughtered goat were examined. A significant presence of blood and water in the intestines and rectum suggested anticipated excess rainfall and potential flooding in the coming season. The colour of the blood was also crucial; red blood indicated imminent onset of rain, whereas black intestines signaled possibility of either drought or war/conflict.

An FGD session with elders at Kabulwo shopping centre noted that Elgeyo Marakwet community valued the practice of examining goat intestines for its reliability in providing accurate information and guiding appropriate action regarding weather prediction. This practice promoted their agro-pastoral production and food security. Senior elders would collectively examine and interpret the intestines, sharing their findings to the members of the community. It is important to note that this practice was not a secret affair. Examination of the intestines was not only used for weather predictions; it was also used to predict war, bloodshed, and other calamities during cultural ceremonies. This was indicated by irregular and enlarged veins in the small intestines signaling impending crises.

Oral interview with ecological expert in Elgeyo Marakwet County revealed that County's ecological department has collaborated with traditional seers after discovering that their predictions were in tandem with scientific weather forecasts. The reliability of weather forecasting based on examination of animal intestines indicates that the people of Elgeyo

Marakwet had deep understanding of their ecology, utilizing it to enhance agro-pastoral production and food security. Furthermore, an increase in goat mating was associated with more rain in the coming month, and crocking of frogs was seen as a positive sign of rainfall and the time for crop planting (Sigira, O.I., 2022).

Table 2.1: Summary of the Indigenous Knowledge Indicators for Weather Forecasting in Elgeyo Marakwet

Category of Indicators	Indigenous/Botanical Name (Activity)	Signs/Predictions	Period
Animals	Examination of goat's intestines (*beritab moo*)	Prediction from Examination by experts/traditionalists	2-3 weeks
	Mating of goats	Increased mating of goats indicates heavy rains in the coming season	4 weeks
	Movement of butterfly and birds	A sign of joy indicating rain is near	1-2 weeks
	Migration of Elephants	Migration from the Rimoi Game Reserve towards Lake Turkana and River Kerio means that they are running away from drought and when they start coming back towards the escarpment meant rain is about that start	4 weeks
	Crocking of frogs	A sign of joy indicating rains are near, hence, planting of crops	1-2 weeks
	Appearance of *birech* (red ants)	A sign of rain soon, rain reduce high temperature for easy movements of safari ants	1-2 weeks
Plants	Tuyunwo (*Balanites agyptiaca*)	It shades leaves in the dry season, Flowering on the onset of the Rain	2-3 weeks
	Sorikwo/sorik (*Botthriocline fusca*)	It shades leaves before onset of rain, Flowering on the onset of the Rain	1-2 weeks
	Kokorwo (*Evryytherina Abbysinica*)	Flowering on onset of the Rain	1-2 weeks
	tepengwo (*Vernonia auriculifera*).	Flowering on onset of the Rain	
Heavenly bodies	Observation of position of stars (*Korgap kogel*) and (*Kirgip Kogel*).)	When male star (*Kirgip Kogel Korgap kogel*) is above the female star (*Korgap kogel*), it was not going to rain. When they come closer to each other, it was going to rain	4weeks
	Observation of moon position	Full moon was associated with low chances of rainfall	
		When the new moon is surrounded by rainbow like color indicates it was going to rain	2-4 weeks

Source: Researcher, 2022

From Table 2.1, it is evident that the people of Elgeyo Marakwet possessed ecological knowledge that has enabled them to make informed agro-pastoral decisions. This traditional knowledge, derived from years of experience and understanding of their local weather conditions, has been instrumental in minimizing crop failures and ensuring food security.

In a nutshell, traditional knowledge and understanding of local weather conditions obtained over years by the people of Elgeyo Marakwet were founded on a sophisticated grasp of their environment's opportunities and constraints. This deep ecological knowledge enabled them to take deliberate agricultural actions such as when to plant, when to weed, and when to harvest. This reliable indigenous knowledge significantly enhanced ecological management and agro-pastoral productivity, thus improving food security within the community.

2.5 The Elgeyo and Marakwet Agricultural Calendar

During the pre-colonial era, the people of Elgeyo Marakwet developed a sophisticated calendar that delineated distinct seasons (Kipkorir, 1973; Chebet and Dietz, 2000). Insights from key informant interviews opined that this calendar was devised based on indigenous meteorological knowledge and experience of their environment. This facilitated scheduling of agricultural and pastoral activities (Cherwon, O.I., 2022; Sigira, O.I., 2022). This agricultural calendar was focused on onset of rainy seasons and harvesting periods (Kipkemei, 2020).

Traditional year began with preparation of land through clearing vegetation using *moor* (a traditional farm tool for clearing the bush). Cleared vegetation was left to dry in January (*Ngatiato/n'gatyaato*), followed by burning (belso/*belseet*) of the dry remains (Cherwon, O. I, 2022). This practice aimed to fertilize the soil by burning dry remains of plants, weeds, and

other unwanted vegetation before ploughing (Kenneth, O.I., 2022). In February (*Kiptamo/kaptam*), ground was broken up with a *Makombe* (hoe) and sticks, and women then loosened the soils by breaking up lumps. This facilitated planting of millet and sorghum seeds in March (*Iwoot-Kut*). This month marked onset of rains and emergence of green vegetation, thus its name (Cherwon, O.I., 2022). Millet and sorghum seeds were broadcasted randomly (*keleta kesuwek*). This was done by a specialist (Kop Maiyo, O.I., 2022). The seeds were then covered with a thin layer of soil (*keburbur*). Weeding was mostly done by women (Chebet and Dietz, 2000). It was done between April (*iwoot*) and May (*N'gei*). These two months were weeding seasons and were still characterized by heavy rains (Salina, O.I., 2022). Weeding was conducted by handpicking weeds, especially in millet and sorghum fields (Kipkemei, 2020).

The first weeding (*Kibuuch*) occurred in April (*iwoot*) and it was done with meticulous attention as millet and sorghum were still in early stages of development (Kop Maiyo, O.I., 2022). This labor-intensive task was mostly performed in groups (*kibagenge*) or through labour reciprocity (*eunek*). Second weeding took place in May (*N'gei*) (Sigira, O.I., 2022). Harvesting was carried out by women between September (*Kipsunde ne tai/ Kipsunde nyobo tai*) and October (*Kipsunde ne aeng/kipsunde nyobo areeng*).

A small knife (*chepkeseit*), made from iron obtained from the Maasai in Uasin Gishu plateau, was used to cut below the heads of finger millet and sorghum. These were collected in baskets made of animal skin (Len'gu) and transported from the field to the homesteads or granaries (Cherop, 2020). The harvested crops were then sun-dried and stored in the traditional granary (*choge/kapchoge*) (Kop Maiyo, O.I., 2022).

Table 2.2: Pre-colonial Elgeyo Marakwet Agricultural Calendar

Month in English	Month in Elgeyo/Marakwet	Meaning of the name	Agro-pastoral Related Activity
January	*Ngatiato/n'gatyaato*	Month of pincushion plant/driest season	Land preparation/clearing of bushes, weeds, and unwanted vegetation
February	*Kiptamo/Kaptam*	Hot in the fields	-drying the turf/vegetation in the sun and burning -breaking the ground/ploughing
March	*Iwoot-Kut/chemururelkot*	Rain showers/ Onset rains and emergence of green vegetation	Planting season/sowing
April	*Iwoot*	Heavy rains	1st weeding
May	*N'gei*	Heart pushed on one side by hunger	-2nd weeding -Livestock were taken for special type of clay (*ng'enda*) that was salty
June	*Roptui*	Black clouds/black	_
July	*Bureet*	Mist	-
August	*Epeso*	short rains	-
September	*Kipsunde nyobo tai*	Offering to go in the farms	Harvesting
October	*Kipsunde nyobo areeng*	Second offering to god	Harvesting
November	*Mulgul-nyobo tai*	Strong winds	Festive ceremonies/activities
December	*Mulgul-nyobo aeng*	Second strong winds	Festive ceremonies/activities

Source: Researcher, 2022

The agricultural calendar in Table 2.2 exemplifies a profound mastery of the agricultural seasons and yearly cycle. Observance to this calendar ensured that the people of Elgeyo Marakwet planted, weeded, and harvested their crops in alignment with the appropriate seasons. Additionally, the calendar indicates that in May, livestock were taken to obtain a special type of salty clay (*ng'enda*) in Kerio valley, escarpment and highland ecological zones. This promoted Elgeyo Marakwet's pastoral economy.

The festive ceremonies conducted in November and December signified bumper harvest, resulting from effective use of agricultural calendar. Therefore, it can be argued that interaction of the people of Elgeyo Marakwet with their environment enabled them to develop an agricultural calendar to plan their agro-pastoral economic activities. Knowledge of the local calendar provided essential information about agro pastoral farming systems, enabling the people of Elgeyo Marakwet to distinguish various sub-seasons, each named after its most characteristic agro-pastoral activity. This was crucial for agro pastoral production and food security.

2.6 Crop Cultivation

The people of Elgeyo Marakwet are reputable crop cultivators (Critiley, 1982; Kipkorir & Kareithi, 2013; Kipkorir, 1993). They cultivated a variety of crops, with finger millet (*Eleusine coracana*) and sorghum (*Sorghum bicolour*) being the primary staples (Kipkorir & Welbourn, 2008). Introduction of sorghum and finger millet into Elgeyo Marakwet region remains unclear, with debate centering on whether these domestic cereals were introduced alongside domestic livestock during the pastoral Neolithic around 4000-2000 BP or at a later date (Kipkorir, 1973; Chesang, 1973).

The people of Elgeyo Marakwet crop producers possessed knowledge of soil fertility and used various plants as indicators of fertile or infertile soils. Key informant interviews reported that members of the community could identify fertile land by observing the presence of specific plants such as *chepkotiwo* (Black Jack), *chepkarta* (*Amaranthus lividus*), *tilolwa* (Fern), *tebengwo* (Bitter Leaf), and *arap bataa* (Sawe, O.I, 2022). Areas where these plants were found were recognized as fertile and were subsequently cultivated for food crop production (Mary, O.I., 2022).

Presence of grass such as *chemorut* (*Digitarias calarum*) indicated soil infertility, and such soils or areas were not cultivated (Busienei, O.I., 2022). Oral interviews further revealed that soil fertility was also viewed in relation to the density of the derived vegetation. Dense-derived vegetation signified fertile soils, while stunted vegetation was a sign of infertile soils.

Table 2.3: Plant Species Used as Indicators of Soil Fertility and Soil Infertility

Plant Species	English Name	Botanical Name
i). High fertility		
Chepkotiwo	Black jack	*Bidens Pilosa*
Chepkarta	Amaranths	*Amaranthus lividus*
Seretiot	Kikuyu grass	*Pennesetum cladestinum*
arap bataa	-	-
Tilolwa	Fern	-
Tepengwo	Bitter leaf	*Vernonia auriculifera*
Labotwa	Sodom apple	*Solanum incanum*
ii) Low fertility		
Chemorut	African couch grass	*Digitarias calarum*

Source: Researcher, 2022.

Based on Table 2.3, it can be observed that the people of Elgeyo Marakwet mastered their environment to the extent of developing knowledge on soil fertility, using a variety of plants as indicators of either fertile or infertile soils. This understanding promoted food crop production and enhanced food security.

Key informant interviews also indicated that escarpment ledges offered better soils and climate for crop production (Kiprutto, O.I., 2022). To ensure maximum harvests, the people of Elgeyo Marakwet cultivated plots on these ledges and gentle slopes, as well as on

relatively flat farms in Kerio valley floor (Chebet and Dietz, 2000; Cherop, 2020). Cultivation on the ledges complement agricultural produce from the Kerio Valley ecological zone and served as insurance against total crop failure due to drought, diseases, or pests affecting other farms (Kenneth, O.I., 2022; Koech, O.I., 2022). Consequently, the people of Elgeyo Marakwet arranged their cultivation fields preferably along river banks, in depressions, and on slopes of the escarpment. In these areas, soils were best watered and fertile. This strategy ensured a diverse harvest and cushioned the community against food shortages.

Additionally, contrary to observation by Massan (1968), that apart from some small patches of arable land, the rest of the region was too steep and rocky for any crop. An FGD session held at Tambach shopping centre explained that pre-colonial Elgeyo Marakwet community exploited their three ecological zones of land by considering the complexity and character of their environment in terms of rainfall and temperature. Crop cultivation and grazing of livestock were done on the upper slopes of Kerio Valley and foot hills of the escarpment, while Kerio Valley ecological zone was largely used for grazing purposes (Kipkorir, 1973; Chebet and Dietz, 2000; Cherop, 2019). Cultivation was done along the flood plains of Kerio Valley during the yearly floods, which did not only provide fresh fertile soil for millet and sorghum cultivation but also moisture for growth of grass for livestock (Cherop, 2020). This was to minimize weeds and erosion and to maintain soil fertility using ecological knowledge systems for crop production.

The yearly floods of Kerio Valley were highly beneficial to the Elgeyo and Marakwet people for two reasons. First, it deposited fresh, fertile soils (silt) that enhanced soil quality for cultivating millet and sorghum, thus increasing crop production and promoting food security.

Second, it provided essential moisture for growth of grass, which supported livestock grazing and boosted milk, blood, and meat production (Cherop, 2020). Thus, the Elgeyo Marakwet community commanded detailed indigenous knowledge of their ecology, effectively utilizing it for agro-pastoral production and mitigate risks of food shortages. This comprehensive indigenous knowledge and ecological mastery were crucial for ensuring a diverse food supply from different ecological zones, reflecting pre-colonial African society's food production systems based on keen awareness of the environment (Zeleza, 1989).

Food crop production among the Elgeyo Marakwet communities was a collective effort; men were responsible for land preparation through slashing or burning vegetation, while women and children handled cultivation, weeding, and harvesting (Critley, 1982; Kipkorir, 1993; Cherop, 2020). Organization of family labour, including husband, his wife, or wives and children, was essential for household's self-reproduction (Chebet and Dietz, 2000). Key informant interviews also indicated that, in addition to family labour, labour reciprocity or labour exchange (*eunek/eeruun*) was practiced (Chemitei, O.I., 2022). Cooperative labour parties and practices are well documented in the literature on African production systems (Karp, 1978). The people of Elgeyo Marakwet were no exception in this regard.

In the pre-colonial Elgeyo Marakwet, neighbors cooperated (*kipaken'ge)* in tasks such as land preparation, planting, weeding, harvesting, and herding of livestock. This cooperation was reciprocated later with assistance in similar tasks or with a beer party (Sigira, O.I., 2022). The exchange of labour could involve three or four neighbors. According to Matheka (1992), labour reciprocity in African societies was essential to ensure that labour was available during critical production periods, such as weeding and thrashing. Rodney's (1972) observation that labour was fundamental support of traditional African societies applies to the pre-colonial

Elgeyo Marakwet. Labour organization and reciprocity were integral to facilitating food production and food security through an agro-pastoral economy.

Farmers in the pre-colonial Elgeyo Marakwet, mainly used simple tools, such as digging sticks or elephant bones for cultivating, planting, and weeding their crops (Chebet and Dietz, 2000; Kipkorir & Kareithi, 2013). By mid-19th century, kito'ng (metal works specialists) in Elgeyo Marakwet provided essential farming tools, including *makombe* (traditional hoes) (Chebet and Dietz, 2000). The people of Elgeyo Marakwet also operated furnaces to produce iron tools such as hoes (*makombe*), axes (*aiywo*), panga (*moruut*) and sickles (*ringet*) (Tarus, 1994). Availability of these tools enhanced their ability to clear land and cultivate larger plots, thereby increasing food production and food security. Thus, emergence of metal work specialists in the pre-colonial Elgeyo Marakwet was a necessity that arose from mastering their ecology and optimizing agricultural practices.

In the pre-colonial period, people of Elgeyo Marakwet predominantly cultivated finger millet over other crops (Cherop, 2020). This preference was due to finger millet's drought-resistance and ability to withstand high temperatures characteristics of the Kerio Valley ecological zone (Arap Butan'gong, O.I., 2022). Furthermore, finger millet was less susceptible to pests and diseases (Kop Maiyo, O.I., 2022). However, an FGD with clan elders at Arror shopping centre in the year 2022 revealed that occasional pest and disease outbreaks did occur. In such cases, severely affected crops were uprooted to prevent further spread, and less affected crops were treated with ash. This evidence indicates that the people of Elgeyo Marakwet had extensive ecological and agricultural knowledge. Thus, their pre-colonial crop production system was well adapted to local ecological conditions, offering them food security. Indeed, African pre-colonial economies, as noted by Kjekshus (1977), thrived within

a well-managed ecological system. The relationship between humans and their environment, developed over centuries, reflects a deep understanding and management of environment for sustainable food production (Gakuru, 2006; Berkes, 2009).

Finger millet and sorghum served as the main food staples in households, ensuring sufficient food supply for families (Chesang, 1973; Kipkorir & Kareithi, 2013). These crops were typically sown through broadcasting (Chesergon, O. I., 2022). Cultivation of these crops suited ecological requirements of the region. Finger millet and sorghum flour were used to make *kimiet/kimyet*, a local meal, and to prepare traditional beer (*komen*) for ceremonies (Talaa, O.I., 2022). The chief purpose of harvesting these crops were to produce staple food, finger-millet meal (*kimiet/kimyet*) or *ugali* (Kipkorir, 1973; Chebet and Dietz, 2000). Moreover, finger millet was used to prepare *musar* (porridge) for both children and adults (Cherwon, O.I., 2022). Therefore, cultivation of finger millet and sorghum ensured diverse and ample food supply for the people of Elgeyo Marakwet.

The Elgeyo Marakwet community practiced intercropping (Kipkorir and Mureithi, 2013; Cherop, 2020). Oral interviews indicate that in the pre-colonial period, they intercropped sorghum with millet and vegetables (Talaa, O. I., 2022). Scholars in African agricultural history (Kisaka, 2009; Omwoyo, 2004; Muchoki, 1988; Esese, 1990) emphasize that intercropping, practiced by many African pre-colonial communities, was a strategy for risk avoidance. Zeleza (1986) describes it as “the heart of African agriculture,” while Richards (1984) refers to it as “one of the greatest glories of African science.".

A FGD with clan elders who are crop cultivators, conducted at Tambach shopping centre in the year 2022 revealed that inter-cropping was well suited to the needs of Elgeyo Marakwet

in their fragile ecological environment. Key informants noted that leaving the deep soils bare would result in them being washed away by the flash floods of the Kerio Valley. Maintaining constant vegetation cover on sorghum and millet farms helped preserve the soil by preventing erosion. Additionally, intercropping maintained soil fertility. Chebet and Dietz (2000) also asserted that intercropping hindered spread of pests and diseases since neighboring crops, such as finger millet and vegetables, were less likely to be of the same species, which also reduced the burden of weeding. Intercropping was a standard practice in the pre-colonial Elgeyo Marakwet, helping the community avoid food shortages and saving their time and labour.

Adequate food security and self-reliance were achieved by cultivating a variety of crops and vegetables on the same piece of land, with intercropping being well-suited to the agro-pastoral economy and fragile environment of Elgeyo Marakwet community. Intercropping ensured that the community could harvest during droughts (Cherop, 2019). The pre-colonial Elgeyo Marakwet communities, like most pre-colonial African societies, had a thorough grasp of their environment due to their long association with it. They exploited their varied ecology for food production and food security through the cultivation of millet and sorghum (Arap Butan'gong, O.I., 2022). Thus, it can be argued that crop cultivation among the Elgeyo Marakwet was determined by their ecology or the physical environment.

The Elgeyo Marakwet communities also engaged in barter trade amongst themselves; for instance, those living in Kerio Valley ecological zone exchanged goods with those living in escarpment and highland ecological zones to ensure food security during times of prolonged drought (Kipkorir & Welbourn, 2008; Cherop, 2020). Furthermore, the community practiced shifting cultivation, shifting to new plots when crop yields declined (Koech, O.I., 2022). This

method involved allowing land to lay fallow for four to five years, facilitating soil fertility recovery, preventing soil exhaustion and depletion of essential minerals, hence, reducing the need for extensive weeding efforts (Chebet and Dietz, 2000).

Zeleza (1986) noted that shifting cultivation is commonly applied to agricultural systems where land is cultivated only for two to three planting seasons before being returned to natural vegetation for several years. This practice restored soil fertility, maintained soil moisture, and reduced soil erosion (Chesergon, O.I., 2022). In the pre-colonial Elgeyo Marakwet, shifting cultivation was feasible due to the sparse population and relative abundance of virgin land available for crop cultivation (Chesang, 1973; Tarus, 1994; Chebet and Dietz, 2000).

In the pre-colonial Elgeyo Marakwet, when farm yields declined, farmers would leave fields to fallow and cultivate other virgin lands. Fallow land was left undisturbed for two to three cultivating seasons. Key informant interviews stated that:

> In the past, Elgeyo Marakwet had plentiful land because the population was sparse, unlike today, where the population is high. Back then, we used to cultivate one piece of land for two to three years; when it got exhausted of fertility, we left it fallow for livestock grazing and moved on to clear new, uncultivated and fertile forest areas for better yields of millet and sorghum (Cherwon, O.I., 2022).

From the key informant interview, it can be noted that the people of Elgeyo Marakwet understood their ecology well. By practicing shifting cultivation, they reduced soil erosion and maintained soil fertility, leading to better productivity of food crops such as millet and sorghum. Besides, there was little change in the ecosystem as cultivated fields reverted to

vegetation. Shifting cultivation among Africans demonstrated that traditional land use systems were well adapted to environmental limitations, as any viable agricultural systems should be (Allan, 1965; Zeleza, 1989).

Shifting cultivation enabled movement of individual farmers to different plots with varied micro-ecological conditions, allowing them to spread risks (Omwoyo, 2004). This variability in environmental circumstances checked the spread of pests and diseases, control weeds and address unanticipated soil performance issues, resulting in increased food production and enhanced food security. It is also important to point out that, besides cultivating millet and sorghum, the pre-colonial Elgeyo Marakwet community also grew other crops such as "local" maize (*Chebolosiot*), cassava (*Manihot esculens*) and sweet potatoes (*Ipomea batatus*), albeit on a small scale (Chebet and Dietz, 2000; Kipkemei, 2020).

During times of drought and famine, *Orkoi* (rainmakers) from Toyoi clan (the rainmaker clan among the Elgeyo and Marakwet people) were often approached with animals for offerings or sacrifices at *kapkoros* (sacred sites for offering and appeasing god of rain). They were expected to intercede on behalf of the community (Kipkorir, 1993). *Orkoi* performed specific rites (details of which clan elders chose not to disclose) to appease *ilat* (the god of rain) and seek solutions community's problems. Veneration of *ilat* was conducted by men along river valleys, especially around bubbling plunge pools believed to be the 'homes' of this deity. This worship was prerogative responsibility of the Toyoi clan (Cherop, 2020).

It was only Toyoi (Rain) clan that had the power to influence rainfall. *Orkoi* (rainmakers) from this clan were the sole individuals permitted to say prayers and perform rituals to *ilat*, harnessing his power to bring rain for the benefit of society during prolonged droughts

(Sigira, O.I., 2022). The prayers were scheduled several days in advance to allow for the preparation of honey beer and procuring a sheep or goat for sacrifice (Sigira, O.I., 2022). It is worth to note that worship of *ilat* was exclusively male affair; while women did pray to *Asis* (*koros ap korgo*) during times of natural calamities, their prayers were directed to *Asis,* not *ilat* (Cherwon, O.I., 2022). These practices aimed to secure rain for agro-pastoral production in the community.

Shrines of *ilat* are located in Kondabilet along River Moiben, Kapcheptugen along River Arror and river Kerio, Emsoo along River Emsoo, and Kapcheptun'gung along River Moiben (Justine, O.I., 2022). When asked about the origins of worship at these sites, the elders could not provide an exact date, but agreed that these sacred sites have existed since time immemorial. *ilat* was not merely considered a natural hazard, but was also viewed as the super-agent of *Asis,* the god of the Kalenjin people (Kipkorir, 1973; Chesang, 1973).

A FGD with clan elders at Kapcherop shopping centre in the year 2022 revealed that worship of *ilat* was not limited to times of food crisis caused by prolonged droughts but also occurred during instances of swollen rivers, mudslides and landslides that affected granaries, livestock and people. During such events, *ilat* was propitiated in hopes of locating the missing livestock and people (Koech, O.I., 2022). Additionally, key informant interviews indicated that *ilat* was invoked to establish permanent boundaries in cases of land disputes between clans or within a clan (Kalkal, O.I., 2022). This practice, thus, settled land disputes, promoted agro-pastoral economy and contributed to food security.

Based on the discussions, it can be argued that Elgeyo Marakwet demonstrated a profound understanding of their ecology through their knowledge of soil fertility, cultivation practices

for millet and sorghum, and utilization of the three ecological zones for agro-pastoral production. Their practices included organizing family labour, intercropping, shifting cultivation, and employing rainmakers during periods of natural calamities such as drought, famines, floods, and landslides. These methods collectively indicate a mastery of their ecological environment that ensured effective agro-pastoral production and food security.

2.7 The Marakwet Indigenous Furrow Irrigation Systems

The practice of irrigation is a major determinant of food security in ASAL regions such as Marakwet (Sutton, 2004; Osteberg, 2004; Kipkorir & Kareithi, 2013). Since its inception, irrigation has significantly contributed to crop production worldwide (Kipkorir & Kareithi, 2013). Irrigation, which is a process of supplying water to cultivate plants through means other than natural precipitation has been essential for developing arid and semi-arid lands in Kenya, including Elgeyo Marakwet, through enhanced crop production (Stern, 1979; Soper, 1983). It is estimated that one-third of the world's food is produced using irrigation (Kisaka, 2009).

The indigenous technology based on irrigated farming, such as Marakwet indigenous furrow irrigation systems, employs inexpensive and simple technology (Lowe, 1986; Sutton, 2004; Osteberg, 2004; Kipkorir & Kareithi, 2013). Irrigator community often tends to identify closely with their irrigation systems (Adams *et al.*, 1988; Davies et al., 2012). Irrigation is a critical means of crop production, and for many centuries, indigenous irrigation systems have proven successful in enhancing food production (Ssennyonga, 1986; Klinken, 1987; Kipkorir and Kareithi, 2013).

The Marakwet living in Kerio Valley could not have survived in the harsh environment were it not for indigenous irrigation systems (Kipkorir, 1993). Crop cultivation in the Marakwet Kerio Valley ecological zone is largely supported by traditional irrigation furrows (Henning, 1951; Kipkorir & Kareithi, 2013; Cherop, 2020). In contrast, there are a few irrigation furrows in Keiyo area and Elgeyo Marakwet highland ecological zone, as these areas generally receive regular rainfall that makes irrigation less necessary (Chebet and Dietz, 2000). The Marakwet furrow irrigation systems have been in existence for over 400 years (Henning, 1951; Kipkorir, 1993; Soper, 1983; Van-Klinken, 1987; Ehret, 2002). Although direct evidence of their origin remains unclear (Cherop, 2020). This technology was developed thousands of years ago as a strategy to enhance crop production and ensure food security (Osteberg, 2004). Its use and conservation have since been passed down from generation to generation (Kipkorir and Kareithi, 2013).

Irrigation furrows are located on Marakwet escarpment in Elgeyo Marakwet within Kerio Valley of Kenya (Davies et al., 2012). According to Kipkorir (1993), Marakwet community chose to settle at the Elgeyo Marakwet escarpment largely for security reasons. Dense Cherangany hills forests sheltered the escarpment from the western side, while Kerio River deterred enemies from the east. Any approaching enemies could be seen from a distance as they advanced towards the escarpment. Thus, Marakwet relied on the stretch of land between the escarpment and Kerio River for agro-pastoral production and security (Ruttoh, 1988; Kipkorir, 1993). Crop cultivation in this area was challenging due to inadequate and unreliable rainfall. As a result, Marakwet resorted to irrigation, thus leading to the development of indigenous irrigation systems (Ruttoh, 1988; Sigira, O.I., 2022). They created communal furrows that run parallel to each other and supply water for downstream irrigation (Soper, 1983).

The people of Marakwet, intimately connected to the contours of the highland ecological zone, carefully selected reliable water sources that would sustain their agricultural landscape through an intricate furrow system. They constructed take-off dams at various water sources to regulate the flow of water into the main canal, which precisely followed the terrain's contours (Cherwon, O. I., 2022). These canals were gradually excavated from the highland ecological zone, through the escarpment, and down to the Kerio Valley ecological zone (Cherop, 2020). The contour furrows not only facilitated graceful navigation of water by gravity to the agricultural fields but also shielded the furrows against lateral and vertical erosion (Cherwon, O. I., 2022).

Along the furrows, Marakwet community constructed terraces to control and reduce the speed of water and prevent soil erosion. They also built furrow branches to divert water from the main canals into homes and specific clan farms (Cherop, 2020). Additionally, regulating valves were constructed along the furrows to serve as key control points for managing the flow and distribution of water to various agricultural farms. This ensured that each Marakwet clan received an adequate water supply through furrow irrigation to promote food crop production.

Furrow walls were reinforced by perching stones, wood, leaves, and mud to compact the soil, thereby reducing the risk of erosion (Cherwon, O.I., 2022). Grass was also planted along the furrow walls to help stabilize the soil (Cherop, 2020). Roots of these plants bound the soil particles together, acting as a protective layer to reduce the impact of erosion caused by furrow water. This design of the furrow irrigation systems was intended to achieve efficient

water utilization, minimize soil erosion and optimize irrigation for sustainable agricultural productivity.

The indigenous irrigation furrows/systems include Chemenengir and Muyen furrows, Kabonon-kapkaniak furrows, Kapchebar furrows, Kapsogom furrows, Kapchepkee furrows, Lukuk furrows, Kapsiren furrows, Kapterik furrows, Kasukut furrows, Kamariny furrows, Kapsyoi furrows, Kaptebeko furrows, Kamariny/Kabarmwar furrows, Shaban furrows, and Kasike furrows (Sigira, O.I., 2022; Justine, O.I., 2022). These irrigation practices are mainly located in Kerio Valley ecological zone of Marakwet (Soper, 1983). These furrows are owned and shared by clans; for instance, Kabonon and Kapkamak clans share Kabonon-Kapkamak furrows, with each clan entitled to weekly use. In cases of breakage, clans collaborate to repair the furrows (Ssennyonga, 1986; Davies et al., 2012). This collaborative approach was common among all clans in the area. As a result, irrigation in Kerio Valley emphasized maximization of water for agricultural production.

Kerio Valley ecological zone is one of the driest areas in the Republic of Kenya (Ruttoh, 1988; Kipkorir & Kareithi, 2013). Furrow irrigation systems form tangible cultural heritage of Marakwet people and has been used for crop irrigation and production (Osteberg, 2004). Ssennyonga (1986) asserted that irrigation in Kerio Valley emphasized maximization of subsistence, as exemplified by the crops grown, which include sorghum, finger millet, cassava, and bananas. This study submits that irrigation of these crops in the Kerio Valley ecological zone enhanced food production and food security in pre-colonial Marakwet.

Establishment of irrigation systems in Kerio Valley Marakwet District dates back to 400 years ago (Kipkorir & Kareithi, 2013). Kipkorir (1993) avers that Marakwet community

living in Kerio valley do not claim to have dug the first channel. An FGD session held at Arror shopping centre with Marakwet irrigators in the year 2022 stated that Marakwet irrigation furrows were initially dug by the Sirikwa people. However, key informant interviews postulated that the people of Marakwet are certainly responsible for the technology and construction of the present furrow systems. Thus, the pre-colonial people of Marakwet employed indigenous irrigation using waters from permanent rivers such as the rivers Embobut, Arror, Embomon, Enou, Tunyo, Chebilat, Kiptinos, Embolot, and Chesegon to cultivate food crops such as millet and sorghum during long drought spells in Kerio valley/*keu*, and to water their livestock along the furrow water systems (Kimoi, O.I., 2022). This promoted agro-pastoral production and food security.

Key informant interviews also noted that, prior to preparing any land for cultivation, community members would gather together to decide on a common site to cultivate. This practice was based on distribution of irrigation water (Cherwon, O.I., 2022; Sigira, O.I., 2022). By situating cultivated fields closer to each other, the community could more easily and efficiently manage furrow water (Cherop, 2020). Minor distribution channels to each plot also reduced the distances and minimized loss of water through seepage and evaporation. Furthermore, the selection of common site was influenced by whether the land had regained sufficient fertility after being left fallow or if it was virgin land (Cherwon, O.I., 2022). This approach was aimed at ensuring maximum utilization of water for agro pastoral production and food security.

Marakwet farmers used flooding irrigation method by simply directing furrow water to agricultural fields using traditional tools such as hoes (*mokombe*) and other local implements like *moor* (Kipkorir & Welbourn, 2008; Kipkorir & Kareithi, 2013). The distribution of

irrigation water to various farms was managed by water clan elders (*Kimwar)* (Cherop, 2020). Driven by their interest in crop cultivation, these elders developed extensive furrow water use management rules (Ruttoh, 1988; Kipkorir, 1993; Kipkorir & Kareithi, 2013). The traditional irrigation furrows facilitated cultivation of millet and sorghum by ensuring a consistent and rotational water supply to each Marakwet clan's agricultural fields. This enabled each clan and household to produce food for their families.

Key informant interviews revealed that many families were able to grow millet and sorghum during the dry season using the indigenous furrow irrigation systems (Cherwon, O.I., 2022; Sigira, O.I., 2022; Kimoi, O.I., 2022). Construction and management of these furrow systems by *Kimwar* ensured that farms in Marakwet Kerio Valley ecological zone were not adversely affected by dry seasons (Cherwon, O.I., 2022). This demonstrates Marakwet people's mastery of their ecology, allowing them to produce food through cultivation and irrigation of millet and sorghum, hence, maintaining food security.

Indigenous furrow irrigation systems played a vital role in crop production and food security in Marakwet, Kerio Valley. Furrows were solely under strict management by *Kimwar*, who were responsible for equitable distribution of water to various clan farms and maintenance of the furrow channels (Kipkorir & Kareithi, 2013; Cherop, 2020). Furrow water was conveyed through canals over long distances to the agricultural farms in the Kerio Valley floor. Farmers per clan had specific irrigation schedules (Cherwon, O.I., 2022). Water was allocated rotationally, one clan received it during daytime (*tisho*), then from afternoon to midnight, while another clan from midnight (*toboi*) to 11 a.m. (Cherop, 2020). This rotation ensured fair distribution of water among the various Marakwet clans during dry spells for crop cultivation.

The distribution of irrigation water in Marakwet was closely tied to communal participation in the maintenance of the furrows (Kipkorir & Kareithi, 2013; Cherop, 2020). Clan elders (*Kimwar*) oversaw the opening of the furrow outlets, managed directing water flow into the farms, and closing the outlets once crops had received sufficient water. Michael (1978) supports this by stipulating that irrigation efficiency is influenced by the design of irrigation systems, management, degree of land preparation and skills of the irrigators. Households were entitled to water during designated irrigation periods (Adams. *et al.,* 1997; Kipkorir & Kareithi, 2013). Families or clans without rights or direct furrow access could obtain water through forming alliances or purchasing it during free periods *(lugon*-11 a.m.–2 p.m.) when one clan was "taking over" water from another clan (Kipkorir, 2008).

In the pre-colonial Marakwet, women who had no adult men to take part in regular repairs and maintenance of furrows were expected to hire males for these tasks to access and use irrigation water (Kipkorir & Kareithi, 2013). Key informant interviews stated that women were culturally prohibited from participating in furrow repairs and maintenance due to beliefs that such involvement would cause miscarriages and infertility (Kimoi, O.I., 2022). Despite these cultural restrictions, hiring male laborers for furrow repairs and maintenance allowed women to secure water for irrigation, hence promoting crop production and household food security.

Based on the discussion, it can be noted that Marakwet furrow irrigation was crucial to their agro pastoral economy. The people of Marakwet effectively exploited their ecological knowledge through irrigation to support food production. Clan water elders (*Kimwar*) played a key role in managing and maintaining these irrigation furrow systems in ensuring equitable distribution of water. This system allowed the community to maximize irrigation benefits,

adapt to their fragile environment, and maintain food security despite ecological challenges. The indigenous furrow systems were therefore instrumental in cushioning the community against food shortages and ensuring overall food security.

2.8 The Storage of Crop Produce among the Elgeyo-Marakwet

In pre-colonial Africa, homesteads within various African societies were composed of diverse structures, each serving specific functions such as sleeping, safeguarding livestock at night, and storing food (Kipkorir, 1993; Cherop, 2020). Design of these homesteads varied according to the cultural practices and experiences of the builders (Kipkorir, 1993). One of the pre-colonial food crop storage structures that is still in use in Elgeyo Marakwet, Kerio Valley ecological zone, albeit on a small scale, is the traditional granary.

Key informant interviews indicated that no one knows the original history of the traditional granary (Justine, O.I., 2022). However, during FGD held at Arror shopping centre in the year 2022 with millet and sorghum cultivators, community attributed its construction to their forefathers. This study observed in the field that in Kerio Valley ecological zone, the people of Elgeyo and Marakwet still possess and utilize some of the oldest granaries, however, they were few in number. Among the Elgeyo and Marakwet, the traditional granary is referred to as *choge/kapchoge*.

Figure 2.1: The Traditional Granary (kapchoge/choge)
Source: Researcher, 2022

The Elgeyo Marakwet choge/*kapchoge/kapchogen* was traditionally constructed using locally sourced materials, such as wattle. The structure is round and approximately 8 feet high, with conical roof (Kipkorir and Kareithi, 2013). Roofing materials and poles were selected from hardwood trees, chosen for their resistance to termites and other pests (Kipkorir and Kareithi, 2013; Cherop, 2020). The granary was thatched with a special long grass obtained from Elgeyo Marakwet escarpments (Cherop, 2020). Key informant interviews noted that this design facilitated proper aeration and temperatures regulation. The interior of the granary was smeared with a mixture of mud, cow dung, and ash.

According to key informant interviews, the mixture of mud, cow dung, and ash used in coating granary's interior was effective in repelling pests such as weevils by suffocating them (Kimoi, O.I., 2022; Kirop, O.I., 2022). To prevent spread of diseases, harvested crops, especially sorghum, were stored separately from previous seasons' harvests in new storage

areas; sorghum, being softer than millet, was more susceptible to pest attacks (Kimoi, O.I., 2022).

The Elgeyo Marakwet traditional granary further kept away pests as the interior environment could rarely support any life due to cool temperatures and limited oxygen (Kipkore, O.I., 2022). The granary was elevated about one meter off the ground, which not only deterred termites and rodents but also prevented water infiltration during flash floods (Kipkorir and Kareithi, 2013). Stored millet in the *kapchoge* could last for five to ten years, a duration that ensured that the people of Elgeyo Marakwet were food secure. Moreover, the granary was used to store selected genetically strong and healthy sorghum and millet seeds for next planting season (Cherop, 2020). These advanced storage techniques, which permitted grain to be preserved for extended periods, insured the community against food shortages (Omwoyo, 2004). An FGD session held at Arror emphasized that:

> ...construction of traditional granaries requires the expertise of a seasoned and skilled man, guided by wisdom and experience. This process involved both genders. A man's role was to gather the building materials, such as poles, rafters, and ropes, from preferred indigenous hardwood tree species and spearhead construction. Upon completing the foundation and overall construction, he finishes his task by thatching the roof with special tall grass, and a woman collects grass from Elgeyo Marakwet escarpment for thatching and prepares the interior of the granary. She does by collecting mud and mixing it with cow dung and ash, which she then smears on the inside walls and floor to smoothen the surface. This mixture of mud, cow dung, and ash act as repellent to pests... (FGD., 2022).

It is also important to note that *Kapchoge/choge* were constructed in the escarpment ecological zone, which is cooler area (Chebet and Dietz, 2000). This location was chosen to prevent destruction of harvested grains by weevils. Additionally, *kapchoge* in the escarpment ecological zone was also guarded by a man who received handfuls of grain each time withdrawal was made as compensation for his services (Kipkore, O.I., 2022). Key informant interviews revealed that such men were often poor and relied on those with grain for their livelihood (Ruto, O.I., 2022).

During field work, a key informant, a leading millet and sorghum farmer, submitted that, since she was young, *kapchoge* have been the primary means of food storage and have the capacity to preserve food for more than 5 years. The traditional granary is revered by the community, considered an important structure for every homestead, and symbolizes a farmer's strength and wealth. It indicates that a farmer is hardworking and can provide food and security for the family (Kop Maiyo, O.I., 2022). Similarly, another key informant, a clan elder, opined that an empty *kapchoge* signifies laziness. Moreover, a full *kapchoge* was advantageous to any man seeking to marry, as it demonstrated his hard work and intent to provide for his family (Kalkal, O.I., 2022).

Furthermore, according to existing oral traditions of Elgeyo and Marakwet communities, it was and remains a taboo to burn or destroy a granary. Stealing from people's granaries was strictly forbidden and carried severe consequences (Kirop, O. I., 2022; Cheserek, O. I., 2022). These prohibitions were intended to encourage members of the community to engage in crop cultivation and livestock rearing for the well-being of their families (Cherop, 2020). The people of Elgeyo Marakwet also fenced their homestead, which included kraal, granary, and houses, to serve as protection strategy for both granary and livestock. Livestock played

additional role; one of the goats was fitted with a bell around its neck, which would sound an alarm in case of any disturbance, alerting the household (Kirop, O.I., 2022). This practice was designed to protect stored food and livestock from theft, thus ensuring sustainable food security.

In the pre-colonial period, there were two categories of granaries (*kapchogen*) for storing crop harvests within a homestead, one designated for the wife or wives (*Kapchogo korka*) and the other for the husband (*kapchokap muren or Motiet*) (Kirop, O.I., 2022; Kipkore, O.I., 2022). *Kapchogo korka* was utilized by the wives to feed their households (Kipkorir & Kareithi, 2013). The traditional granary functioned as a bank or a safeguard against food shortages (Chesang, 1973; Chebet and Dietz, 2000). In times of famine, husband's granary produce was used to supplement wife's grain supply (Kipkorir, 1993; Kipkorir and Welbourn, 2008; Cherop, 2020). According to key informant interviews, the produce stored in the husband's granary was reserved exclusively for periods of extreme food scarcity and was mainly used to feed his family (Chemuok, O.I., 2022).

The practice of separating male head of household's harvest from the wives is a widely observed food security measure in Africa, where the man's food store serves as a strategic reserve in case of drought (Akong'a and Kareithi, 1998; Kipkorir and Welbourn, 2008). An FGD session conducted at Tambach with clan elders in the year 2022 averred that among the Elgeyo Marakwet, households' heads who managed their *kapchokap muren* or *Motiet* carelessly were publicly condemned by elders during community gatherings, and were unlikely to receive food assistance from friends and relatives during food crisis. Key informant interviews also revealed that, in times of food abundance, man would exchange his stored produce for livestock or land (Komen, O.I., 2022). Moore (1986) and Akong'a and

Kareithi (1998) also submit that in times of food abundance, grain in man's granary was mainly reserved for brewing local beer for traditional ceremonies within the kinship. An interview with a key informant, a clan elder submitted that:

> …I am a disappointed clan elder; the present generation of Elgeyo Marakwet no longer adheres to our traditional crop storage practices, such as having separate granaries for men and wives. This departure from tradition may be the main reason why, in recent times, we have been periodically affected by food shortages and famines (Cherwon, O.I., 2022).

Based on the submissions by the various key informants, and discussions, Elgeyo Marakwet traditional granaries, were highly valued and built to last. Expectation for every man to have a granary stocked with food reflected community's customs, which demanded each household to produce and store crop harvests for family consumption. The practices involved harvesting, transporting, and storing food crops in these granaries, along with high value placed on them, illustrate how the community effectively managed their ecology for crop production and food security. Thus, these methods of crop production and storage greatly contributed to warding off food shortages in the pre-colonial Elgeyo Marakwet.

2.9 Livestock Keeping Among Elgeyo and Marakwet

The Elgeyo and Marakwet communities, like many other pre-colonial African societies, depended heavily on livestock production for their livelihood. Livestock keeping has historically been the main occupation for the Elgeyo and Marakwet (Kipkorir, 2008; Changa'ch, 2011; Cherop, 2020; Tarus, 1994). Originally, these communities were predominantly pastoralists (Kipkorir, 1973; Chesang, 1973; Tarus, 1994). They had a preference for pastoralism over agriculture, just like other Kalenjin sub-groups (Chesang,

1973; Kipkorir, 1973; Sutton, 1976; Chebet and Dietz, 2000). Historically, the Elgeyo and Marakwet are known for their love and devotion to cows; a cow has a place of its own, a position next in importance to his children (Kipkorir, 1973; Chesang, 1973). Cow, also referred to as *tany* in Elgeyo Marakwet, is the most valued animal. From an early age, children were taught importance of livestock, including how to guard them against theft and how to raid other communities for additional livestock (Kiprutto, O.I., 2022; Kipchoge, O.I., 2022).

Among the Elgeyo and Marakwet, children and those circumcised were made to play with yellow solanum berries as their ‘livestock’ such as 'goats’, ‘cows’ or ‘sheep’ (Cheserek, O.I., 2022). Naming their cattle was based on various characteristics including colour, behavior, place of origin, and special markings; for instance, well-fed and sleek-haired (*sambu*), shy (*ngosos*), light grey (*chebarus*), dapple grey (*samoo*), complete black (*miso*), red-brown (*sitye*), several colors (cheplege), white head (*chelelmet*) and partially brown (*mukye*) (Kenneth, O.I., 2022). These distinctions were also reflected in livestock-related sayings like *abeshe tany*, proverbs, songs, and customs. This naming practice highlights prominent role that cattle play in the Elgeyo and Marakwet society, demonstrating their deep affection for and understanding of their livestock and livestock economy.

Cattle represented highest form of saving in the Elgeyo and Marakwet economies, fulfilling political, social, economic, and subsistence needs (Chesang, 1973; Cheserek et al., 2012). In pastoralist East African societies, men gained prestige and power through bravery in predatory raids, as well as by accumulating large herds of livestock (Kandagor, 2005). The significance of cattle in Elgeyo Marakwet social and political system was reflected in their social structures and institutions (Chesang, 1973). Animal wealth was a key determinant of

economic, political and social status of a person in society (Chesang, 1973; Tarus, 1994). Livestock-based livelihoods was deeply embedded in socio-cultural norms, beliefs, values and traditional knowledge (Davis, 1962). Additionally, livestock were used for bride wealth and exchanged for rights to furrow water for crop irrigation in Kerio Valley (Osteberg, 2004).

Furthermore, household items such as plates and bedding were made from livestock hides and skins (Chebet and Dietz, 2000). Livestock were also used to pay fines for social transgressions. Thus, livestock keeping served as multifaceted livelihood strategy that provided food and supported ecosystem conservation while honoring cultural and traditional values (Cherop, 2020). By around 1850, cattle economy had become highly valued, with man's prestige being measured by the number of cattle he owned (Chesang, 1973). Beside prestige, a large herd of stock also provided a guarantee of food security for a household (Kenneth, O.I., 2022).

Livestock keeping in the Kalenjin community, including Elgeyo and Marakwet, has been a predominant occupation alongside other activities such as crop cultivation, hunting, and gathering (Chebet and Dietz, 2000). Davis (1962) highlights the significance of this practice by noting that a greater number of people worldwide depend on pastoral resources than any other form of agricultural. Mwanzi (1977) asserts that Nilotes, including Elgeyo and Marakwet, were majorly pastoralists for many centuries. In Elgeyo Marakwet, people traditionally reared livestock such as indigenous cattle (*kipkaa*) and goats (Kipkorir, 2008; Changa’ch, 2011; Cherop, 2020; Tarus, 1994).

Goat rearing was dominant among the Elgeyo and Marakwet communities, especially in Kerio Valley ecological zone (Arap Kaluk, O.I., 2022). This prominence can be attributed to

the Elgeyo Marakwet ecosystem, which is exceptionally well suited to grazer ecology. Goats, being versatile browsers, fed on a wide range of vegetation and grass (Moore, 1986; Cheserek et al., 2013). Their ability to survive even during severe famines, by eating dry leaves of plants, tree barks, fruits, thorns, and plant roots, further underscores their importance among the people of Elgeyo Marakwet (Tuitoek, O.I., 2022).

Grazing land was communally owned (Kipkorir, 1973; Kipkemei, 2020). Within the homestead compound, the designated grazing area was known as *limo* (Cherwon, O.I., 2022). This was an area within the compound where cattle were released to graze in the morning and in the evening as they awaited to be milked (Cherop, 2020). Moreover, there were distant pasturelands known as *Sergon* where cattle belonging to *kokwet* (village) were communally grazed (Kalkal, O.I., 2022). This strategic diversification of grazing points ensured access to fresh pastures, sufficient minerals, reduced grazing pressure on local vegetation, and improved foraging conditions near the homesteads that was meant for animals that are milked. This approach not only promoted ecological conservation but also bolstered livestock economy. Communal access to these vital natural resources contributed to increased household food production and enhanced food security.

Livestock keeping was a significant economic activity in both the escarpment and Kerio valley ecological zones (Sigira, O. I., 21/3/2022). This was due to its proximity to Lake Baringo and the Kerio- River, which not only provided reliable water but also provided fresh pasture for livestock (Cherop, 2020). Little and Leslie (1999) submit that livestock herding is guided by distinct ecological rationale. It has proven particularly successful in enabling humans' survival in marginal areas (Schneider, 1979; Sindiga, 1981; Kisaka, 2000; Omiti& Irungu, 2002).

Table 2.4: Examples of Reserved Grazing and Browsing Areas

Reserved Area	English Equivalent
Tegeiyat	Hill slopes
Biut ab Kapchi	Areas around homesteads
Kapsergon/Sergon	Grazing land away from home
Tiriita	Plains
Soet/nyanyawet	Wetlands
Karaita	Former cattle *bomas*
Rorotinwek/Roret	Harvested areas
Matuberet	Areas cleared for cultivation but abandoned after shifting cultivation

Source: Researcher, 2022

Table 2.2 demonstrates various strategies employed by the Elgeyo Marakwet community to manage environmental resources, like pastures essential for livestock economy. Reserved grazing was a crucial approach, not only for sustaining pasture resources but also for preventing ecological degradation. Harvested areas (*Rorotinwek/Roret*) were used for grazing immediately after millet and sorghum harvests, before being reverted to cultivation. During this period, livestock fed on crops residues and other materials unsuitable for human consumption as food and fiber (Sawe, O.I, 2022). These reserved grazing areas were designated for seasonal use and were characterized by a specific composition of pasture resources.

The integration of crop and livestock production systems enhances diversity and ecological sustainability of both sectors while also providing opportunities to increase overall food production and food security (FAO, 2010). In the pre-colonial Elgeyo Marakwet community, the practice of reserving harvested areas (*Rorotinwek*) for grazing not only promoted agro-

pastoral economy but also served as an ecological management strategy. This approach acted as a security measure during difficult periods such as drought. Livestock were herded by young men on communal grazing land and organized on a rotational basis (*eunek/eeruun*) either by members of the family or communally by members of *kokwet* (village) (Kenneth, O.I., 2022). This rotational herding system was implemented to save labour, conserve ecology and ensure continuous availability of pasture, hence sustain livestock production and food security.

Key informant interviews opined that livestock were taken for salt lick (*Kapg'eny*) in May (*N'gei*). During this period, livestock keepers moved with their herds in search of a special type of salty clay (*ng'enda*) and saline water (*sukutek*), especially in the escarpment and Kerio valley ecological zones (Ruto, O.I., 2022). Similarly, Chebet and Dietz (2000) aver that Kerio Valley ecological zone was rich in both saline water (*sukutek*) and saltlicks (*ng'enda*). As Rollinson observed;

> …the eating of earth by cattle ...is widespread in Africa and the presence of salt licks…a cutting in the soil licked and eaten by herbivores with beneficial results has for generations been recognized by natives as an asset in grazing (Rollinson,1953).

For the Elgeyo Marakwet, key informant interviews indicated a cow limping while walking was a sign of weakened bones and salt deficiency. In response, livestock were driven to these special points to drink mineral water and lick salts (Barar, O.I., 2022). Another sign of a salt or mineral deficiency in livestock was their tendency to devour anything they came across (Cherwon, O.I., 2022; Kenneth, O.I., 2022).

Livestock exhibited an increasing tendency to consume ashes and destroy trees by removing and eating their bark. It was generally recognized that salt was essential for the health of livestock (Waweru, 1992). Consequently, when such signs were noticed, the entire herd was taken to salt licks and saline water in either the Elgeyo Marakwet escarpment or Kerio Valley ecological zone. There, animals remained for several days, licking minerals and drinking saline water while grazing in the surrounding area until it was observed that they had lost their appetite for these minerals. They were then returned back to their previous pastures (Tuitoek, O.I., 2022). This practice underscores the Elgeyo Marakwet community's deep understanding of their ecology, which enabled them to optimize livestock production and maintain a consistent food supply in form of milk, blood, and meat.

In Kerio Valley ecological zone, livestock had unrestricted access to drink water from any water source, including from irrigation furrow channels (Ruttoh, 1988; Cherop, 2020). However, oral interviews opined that mineral watering points and salt lick areas were usually highly eroded due to the large number of animals driven there, leading to ecological degradation (Komen, O.I., 2022).

The people of Elgeyo Marakwet acquired their livestock through numerous means, such as exchange with land or farm produce, raiding neighboring communities (*tuga chekiboru*), inheritance (*tugab boiyot/kugo*), leasing (*kemindo*) and also through dowry (*Kanyiok*) when their daughters or sisters married (Komen, O.I., 2022). Kipkorir (1973) asserts that *Kanyiok* consisted of up to four cows, a bull and a number of goats. Dowry was often the easiest means of acquiring a substantial number of livestock (Cherop, 2019). Those individuals with many daughters could accumulate significant livestock when their daughters married (Talaa,

O.I., 2022). This cultural practice ensured that every member of the community possessed some livestock for food production (milk, blood, and meat), hence enhancing food security.

The exchange of surplus grain was another way of acquiring livestock (Chebet and Dietz, 2000). One had to produce surplus grain in order to barter it for goats, which would then reproduce and be exchanged for cattle. However, key informant interviews noted that this method took many years for one to accumulate cattle (Cherwon, O.I., 2022). Clan-specific identification of animals was achieved by cutting their ears in distinct patterns, with each clan had a unique cutting of the ear marking to prevent theft (Cherop, 2020). The pre-colonial Elgeyo Marakwet community was knowledgeable about livestock diseases (Komen, O.I., 2022). Key informant interviews revealed that livestock owners could tell that an animal was sick by observing its physical appearance, texture of hair or skin, decline in milk production, and grazing behavior. Notable diseases were East Coast Fever (*cheptigonit*), anthrax (*kiborom*), foot and mouth disease (maikutiet/*kipguutik*), red water (*kipkeita*), and bloat (*kewiren*) (Komen, O.I., 2022).

The Elgeyo Marakwet community had expert herbalists (*chepkerichinik/chepsakitin*) who treated livestock diseases using certain medicinal plant concoctions (Kirop, O.I., 2022). For instances, cows with *kiborom* were given local brew (*maiyek/komeek/karangara*), while bloat was treated by chasing the animal around so as to release excessive gas from its stomach (Kenneth, O.I., 2022). Despite these measures, in some instances, they lost their livestock to these diseases (Tarus, 1994). It also important to note that during period of extreme food shortages, people of Elgeyo Marakwet ate meat of dead livestock, provided the animal had not been killed by anthrax (Sigira., O.I., 2022; Cherwon, O.I., 2022).

An FGD session with livestock keepers conducted at Arror shopping centre in the year 2022 stated that traditional test for smallpox in livestock involved dipping the dead animal's liver in sand. If the liver burst, the meat was deemed unsafe for consumption. This practice illustrates how the Elgeyo Marakwet community developed sophisticated traditional veterinary methods to check, control, and treat a range of livestock diseases. Thus, it can be argued that the Elgeyo Marakwet demonstrated a profound understanding of their ecology through these advanced practices.

During periods of food scarcity, cattle were particularly valuable as source of sustenance with blood drawn from the jugular vein using a specialized arrow known as *kaplon'gin* or *lon'gno* (Tarus, 1994; Cherop, 2020). The cow blood was collected in pot-like wooden container called *kapkorotiik,* while for goats, a small bow-like container called *taapeet* was used (Kalkal, O.I., 2022). Furthermore, livestock breeding aimed to enhance animal health (Tarus, 1994; Omwoyo, 2004; Kandagor, 2005; Cherop, 2020). This was achieved by removing blood (*kechar*) from an infected animal using *kaplon'gin* then mixing this blood with medicinal herbs. This mixture was given to uninfected animals as a way of immunizing them (Chepkon'ga, O.I., 2022). This approach not only provided crucial food resource but also contributed to health management of livestock. An interview with a clan elder noted that;

> …in the pre-colonial period, Elgeyo and Marakwet raised zebu cattle (*kipkaa*) in large numbers because they were suitable for their ecological zones, particularly Kerio Valley and escarpment. They were kept for milk, meat, and blood. During hard times or famine, a man or father of the household could select one of the fat bulls from his herd and pierce at the neck using a special spear to obtain blood, which was directed to a wooden basin, then stirred and fried for family consumption... (Sawe, O.I., 2022).

From the key informant account, it is evident that the pre-colonial Elgeyo Marakwet community effectively mastered their ecology, thus raising large herds of cattle (*kipkaa*) that were well-suited to their ecology. This practice served as an adaptive strategy for food production and food security. Collecting of blood from cow's jugular during times of scarcity further shows how livestock keeping functioned as crucial food security mechanism. Maintaining large herds of cattle acted as resource reservoir, providing essential supplies to meet community's needs.

Key informant interviews observed that in times of drought, cattle and goats rapidly recovered with onset of rains, providing milk and blood long before crops could yield food (Cherwon, O.I., 2022; Sigira., O.I., 2022). Little and Leslie (1999) opined that in pre-colonial Africa, livestock were capable of converting grasses inedible to humans into milk and meat for consumption. Thus, livestock keeping among the Elgeyo Marakwet was an ecological adaptive strategy that provided food in form of milk, meat, and blood, even during periods of drought. The significance of livestock in the Elgeyo Marakwet social system was well expressed in their social institutions (Chesang, 1973).

Calamities such as human and animal pestilence, diseases, drought, and famine were interpreted as suggesting that the ancestral spirits were angry with the living (Chesang, 1973). This called for an appeasement ceremony, which involved slaughter of livestock (Kipkorir, 1973; Cherop, 2020). Goats were commonly used in sacrificial feasts (Kipkorir, 1973; Chesang, 1973). These sacrifices were believed to address issues such as lack of rain, highlighting social function of livestock within the Elgeyo Marakwet economic system. This illustrates the adaptive mechanisms for food security among the pre-colonial Elgeyo Marakwet, reflecting mastery of their ecological environment.

Transhumance, involving seasonal migration and grazing of livestock, was in itself an important ecological adaptation, which explains why livestock loss during erratic climatic changes is less common in mobile than sedentary livelihoods (Waweru, 1992; Little, 2001). In the same vein, human ecologists have argued that pastoralism represents a sustainable mode of production (Ogot, 1979). In the pre-colonial Elgeyo Marakwet, during the dry season (*Ngatiato*), the community took their livestock (cattle and goats) to the escarpments (*lagam/korget*) where shrub vegetation was available. In contrast, during rainy seasons, they moved their herds back to Kerio Valley (*keu/soin/endo*) to graze on newly regenerated grass and vegetation (Kalkal, O.I., 2022). This was possible because land for grazing was abundant, as the community cultivated only small subsistence farms using rudimentary tools, leaving most of the land available for grazing.

Cattle which are grazers, and goats which are browsers contributed to ecological balance by minimizing competition for resources and maintaining health of each species (Cherop, 2020). This diversification of livestock types allowed some species to survive under harsh environmental conditions reducing the risk of total loss as different species have varied susceptibility to diseases. Such strategies increased food productivity by ensuring that livestock could thrive even during adverse conditions. Emphasis on mobility in pastoralism allowed vegetation to recover before being reused, thus reducing pressure on low-carrying capacity grazing areas through seasonal movements between escarpment areas to Kerio Valley. This approach appears to reflect a deep-seated experience and a conscious understanding of their ecology, consistent with the adage that necessity is the mother of invention.

The pre-colonial Elgeyo and Marakwet communities raided their neighbors for livestock, especially cattle (Kipkorir & Welbourn, 2008; Cheserek et al., 2013; Cherop, 2020). Key informant interviews revealed that members of the community (Elgeyo and Marakwet), those living in Kerio Valley ecological zone, had well-organized warriors from the age sets for cattle raids from their neighbors Pokot and Tugen (Cherwon, O.I., 2022). Elgeyo mostly raided Tugen, while Marakwet raided Pokot, and in some instances, Elgeyo and Marakwet raided each other (Kipkosgei, O.I., 2022). The institution of circumcision was used to train and inculcate in the minds of male initiates the sanctity of raiding (Sigira, O.I., 2022).

During circumcision, this training was enhanced by formal intensive training and 'practicals', lasting up to one year of warriorhood (Cheserek et al., 2013). Raiding activities were mainly aimed at restocking livestock lost to either diseases or drought (Chesang, 1973; Kipkorir, 1973; Chebet and Dietz, 2000). This underscores significance of livestock economy in Elgeyo Marakwet economies, serving as both source of food and a strategy to mitigate stock depletion. The people of Elgeyo Marakwet demonstrated an understanding of their fragile ecology by ensuring continued food supply through restocking of livestock. In addition, an FGD session with clan elders held at Arror in the year 2022 surmised that apart from raiding livestock from other communities, the Marakwet community also defended their stock from theft by other communities like the Tugen, Pokot, and Maasai.

In the pre-colonial Elgeyo Marakwet community, leasing or loaning animals (*kemindo/kimanakta*) was a common practice (Ruto, O.I., 2022). Animals were leased to relatives (*kaborin/tilya*), friends in the various ecological zones, and even distant acquaintances (Chebet and Dietz, 2000; Kipkorir, 1993; Cherop, 2020). According to key informant interviews, this practice served multiple purposes; it mitigated risk of livestock loss during dry periods, disease outbreaks, and raids; it facilitated cross-breeding to produce

livestock with improved and ecologically adaptable traits for milk and meat production (Ruto, O.I., 2022). It also provided a buffer against food shortages by allowing families obtain food- items (livestock or livestock products) from other homesteads (Matheka, 1992). The system of depositing cattle with relatives or friends not only provided individual and familial insurance against food shortage but also strengthened social cohesion within the society (Hennings, 1951). Thus, animal leasing reinforced community's ability to withstand food shortage crisis.

The emergence of ironworkers (*Kitongik*) in the pre-colonial period saw Elgeyo Marakwet community manufacture cattle bells, that were fastened to cow's neck (Tarus, 1994; Chebet and Dietz, 2000). These bells were crucial for managing movement and security of livestock (Cherop, 2020). Key informant interviews pointed out that cattle bells were equally significant for security of livestock (Koech, O.I., 2022). It also noted that in *kapsergon* kraal, fires were lit to infuse environment with a stench of smoke, that was believed to keep predators like lions, leopards, and hyenas away (Kiprutto, O.I., 2022). The use of smoke and fire to ward off wildlife illustrates the Elgeyo Marakwet's mastery of their ecology, contributing to enhanced livestock production.

In pastoral communities, animals were rarely slaughtered solely for family use (Kandagor, 2005). According to key informant interviews, fresh meat was distributed to neighbors (*bikap kokwo/bikap kokwet*) (Chepkon'ga, O.I., 2022). This practice promoted cooperation and unity among *bikap kokwo/Kokwet* and ensured reciprocity when a neighbor slaughtered in their own animal in future (Cherwon, O.I., 2022). Sharing fresh meat with neighbors not only prevented spoilage, but also established social obligations to reciprocate, reinforcing communal bonds (Kandagor, 2005). Thus, this tradition allowed the Elgeyo Marakwet society

to benefit from their neighbors without needing to slaughter their own. In most cases, it was the male animals that were slaughtered (Kiprutto, O.I., 2022). This was done to preserve as many female animals as possible, to ensure adequate food production, mainly milk, necessary for household's sustenance. This practice was also a strategy for building a large herd for survival and promoting food production and food security through livestock management.

This study, therefore, submits that the pre-colonial Elgeyo and Marakwet communities reflects their extensive knowledge, as demonstrated through practices such as leasing of livestock to relatives and friends, maintaining diverse livestock species, animal bleeding, communal grazing, and strategic movement of livestock between Kerio Valley and escarpment ecological zones. These practices provide compelling evidence of the Elgeyo Marakwet community's mastery and adaption to their ecology, which was crucial for sustaining pastoral production and food security.

2.10 Food Preservation among the Elgeyo and Marakwet

The major foodstuffs among the pre-colonial people of Elgeyo and Marakwet were meat and blood obtained from cattle (*tuga*) and goats (*nekoo*), termites (*Kon'ga*) from anthills, and ugali (*kimiet)* made from millet and sorghum flour (Cherop, 2020). Some of these foods were preserved for future consumption. During onset of long rains, especially in April, members of the community collected termites (*kon'ga*). These termites were prepared by removing their wings, either by sun drying or smoking, and consumed with *kimiet*. Surplus termites were mixed with honey and stored for future use. Honey acted as a preservative (Kipkorir, 2008). The preserved food was stored in specialized small pots, allowing it to remain unspoiled for several months (Cherop, 2020). These preserved termites were particularly useful for hunters during long treks in search of wild game (Cherwon, O.I., 2022).

In the pre-colonial Elgeyo Marakwet, cattle and goat meat were prepared by slicing into strips, drying (*sirken*) through smoking or salting, and stored for future consumption (Sigira, O.I., 2022). This practice was undertaken during periods of food abundance to prepare for unforeseen dry periods (Cherop, 2020). This ensured long-term food security within the community, especially during prolonged drought. Furthermore, there was a tradition of sustainable food consumption among the Elgeyo Marakwet. This discouraged food waste. Key informant interview stated that:

> …One had to eat one type of food at a time. It was taboo amongst the people of Elgeyo Marakwet for one to consume milk and meat at the same time; if one consumed both, it was believed the udder of that cow that milk was obtained from would dry and harden, hence, no milk for family consumption. It was also taboo to consume honey and what remains in the "sufuria" after cooking "kimiet" at the same time. According to our culture, when one does so, the bees will attack honey harvesters, causing a lot of injuries and even death during the next honey harvests (Sigira, O.I., 2022).

Based on the key informant interview, it can be noted that these taboos served as an indirect way of saving food for future use, thereby acting as food security strategy that minimized waste. This cultural practice was orally transmitted from one generation to another (Tuitoek, O.I., 2022). Milk obtained from cows and goats was stored in traditional gourds known as *sotet* (Chesang, 1973; Kipkorir, 1973; Chebet and Dietz, 2000). Milk was mixed with charcoal dust made from a sacred shrub called *senetwet* which had medicinal properties and was used to condition calabashes (Cherop,2020). This mixture was also used to flavor and ferment milk, transforming it into *mursik* (sour milk), which could be preserved for 3-5 days.

This method of milk preservation ensured a steady food supply for the family over an extended period (Kimoi, O.I., 2022).

An FGD session held at Tambach shopping centre in the year 2022 revealed that Maasai women who were married into Keiyo community introduced the practice of mixing charcoal dust with fresh milk to curdle it into *Mursik* (Tuitoek, O.I., 2022). Cow has often been referred to as 'foster mother' of the human race due to significant nutritional value and widespread use of milk and its products (Whettian, 1972). Cow blood also played crucial role in the diet of the Elgeyo Marakwet people (Chebet and Dietz, 2000). Blood was mixed with cow and goat milk to form *cheran*, a nutrient-rich mixture that could be stored for 7–14 days without getting spoiled (Cherop, 2020). According to Kandagor (2005), this practice not only produced protein-rich drink but also believed to improve the health of the animal, particularly at the onset of dry season. Therefore, it can be argued that milk preservation was an integral food security strategy.

Millet and sorghum were traditionally stored as unthreshed heads in granaries (*kapchoge/choge*). In this unthreshed state, millet and sorghum would remain in edible state in the granary for three to six years (Komen, O.I., 2022). The purpose of storing millet and sorghum in this form was to maximize preservation of the grains for future use. Flour for *kimiet/kimyet* was usually produced by grinding de-husked millet and sorghum grains as needed. However, the flour was not stored for extended periods, as it tended to spoil easily (Kipchoge, O.I., 2022).

Similarly, strong and healthy millet and sorghum seeds were selected and stored in the ceiling of the hut, known as *tabut or tobot* (Talaa, O.I., 2022). This storage method was designed to protect the seeds from pests and organisms, with the smoke rising to the *tobot* helping to

preserve the seeds by coating them in soot, which deterred pests like weevils by suffocating them (Kipkosgei, O.I., 2022). The floor of the *Tabut* was tightly packed with wooden twigs to prevent grain wastage (Koech, O.I., 2022). This was done to save seeds for future cultivation from destruction by pests and diseases (Talaa, O.I., 2022). It can therefore be noted that Elgeyo Marakwet food preservation methods demonstrate that they possessed indigenous knowledge crucial for long-term food preservation. They understood their local ecology, which enabled them to effectively store food for future use in times of drought and famine. These traditional food preservation practices were vital for ensuring food security in the region.

2.11 Hunting and Gathering Activities

The earliest known human societies subsisted through hunting and gathering for survival (Chebet and Dietz, 2000). This mode of acquiring food directly from nature was universal among Kenyan communities well into nineteenth century (Omwoyo, 2004; Sheriff, 1985). Hunting entirely dependent on fauna, while gathering relied on flora (Waweru, 1992; Kizito, 1998; Chebet and Dietz, 2000). These modes of food procurement dominated human societies for thousands of years before the advent of agriculture, which introduced domestication of livestock and cultivation of plants (Cherop, 2020).

As much as millet and sorghum cultivation and livestock keeping were the main sources of food in the pre-colonial Elgeyo Marakwet, hunting and gathering of wild animals, fruits, and insects were undertaken to supplement the available food. Elgeyo and Marakwet were skilled hunters and gatherers (Chesang, 1973; Cherop, 2020). They extensively hunted within the confines of Kerio Valley and Elgeyo Marakwet escarpment zones. This was made better by the fact that forest vegetation was communally owned, and was not restricted to any

particular clan, therefore, it served the whole community (Chesang, 1973; Cherop, 2020). However, an FGD session with clan elders that was held at Tambach shopping centre in the year 2022 noted that hunting territories were demarcated to prevent conflicts, ensuring that hunted animal belonged to the occupant of the specific territory.

It is also noteworthy that the people of Elgeyo Marakwet had a keen understanding of seasonal movement patterns of edible wild animals. Key informant interviews indicate that during rainy season, wild animals moved to Kerio Valley floor, whereas during the dry season, game animals migrated and were found along River Kerio and in escarpment areas near rivers and streams (Suter, O.I., 2022; Kirop, O.I., 2022). However, hunting and gathering were practiced on a part-time basis (Cherop, 2020).

Hunting was conducted to safeguard agro-pastoral production ecosystem (Chebet and Dietz, 2000). The Elgeyo and Marakwet communities engaged in hunting and gathering of wild resources, especially during the dry periods of January (*Ngatiato*), November (*kipsunde nebo taai/ kipsunde nyobo taai*) and December (*kipsunde nebo aeng/ kipsunde nyobo areeng*). It was believed that game animals multiplied during rainy season, allowing their populations to grow before the hunting periods (Kimwetich, O.I., 2022).

Hunting was rarely done during wet seasons (Kiprutto, O.I., 2022). It was believed that food resources were abundant during this time, hence hunting activities were suspended. Conversely, during dry season, even those with large herds of goats and cattle would venture into forest to hunt in order to preserve their domestic animals and their products (Cherop, 2020). Hunting wild animals became a major preoccupation during periods of famine (*rubet*). The Elgeyo Marakwet community used various tools for hunting, including traps, snares,

arrows, and spears (Kipkorir, 1993; Tarus, 1994; Chebet and Dietz, 2000). They hunted a range animal such as rabbits (*kiplen'gwa*), gazelles (*boinet*), antelopes *(n'gemei*), buffalos (*soet*), wild pigs (*toret*) and elephants (*belek*). However, it important to note that poisonous arrows were specifically used to kill wild animals that were not intended for consumption, such as baboons (Kibowen, O.I., 2022).

An FGD session with clan elders held at the Arror shopping centre in the year 2022 stated that game meat was shared among hunters. This practice ensured that each person in the hunting group and their families received a portion of the available food. Hunting thus served as crucial means of food acquisition, providing meat as primary resource (Chebet and Dietz, 2000). Additionally, meat obtained from hunting could also be traded for other products or goods, including land (Cherop, 2020).

In the pre-colonial Elgeyo Marakwet, hunting was conducted along River Kerio and in the surrounding woodlands (Chemitei, O.I, 2022). Prior to hunt, the hunting group would convene to decide which specific animal to target. If the decision was to hunt antelope, the group would focus solely on antelope, avoiding the indiscriminate killing of other wild animals. This practice was designed to prevent the depletion of wildlife stocks (Arap Msafiri, O.I, 2022; Arap Kaluk, O.I, 2022). Therefore, selective hunting approach adopted by the pre-colonial Marakwet community can be viewed as an ecological adaptive strategy aimed at preserving both domestic and wild game populations. It is also important to point out that during periods of plentiful harvests, the people of Elgeyo Marakwet suspended hunting and gathering activities. This strategy reflects the pre-colonial Marakwet community's deep understanding of their fragile ecological balance and their efforts to ensure long-term food security.

Besides hunting, the Elgeyo Marakwet community engaged in gathering wild insects, vegetables, and fruits during dry season (Cherwon, O.I, 2022; Koech, O.I., 2022). Women were responsible for collecting various vegetables (*tuyunwo, kisocho, chelelmet, tereme*), mushrooms (*bobek*), grasshoppers (*talamik*), wild fruits, and roots from the Elgeyo Marakwet escarpment and Kerio Valley ecological zones. These gathered foods were small portions that supplemented livestock, food crop production and were consumed the same day or within two days (Arap Kaluk, O.I., 2022). Among the wild fruits collected were *muchukwo* (Barchemia discolor), *tilam* (Zizyphus Mauritania), *chelolo/mboni* (cape gooseberries), and *mokoiwo* (Ficus Sycomorus) (Talaa, O.I, 2022). Moreover, *Aria/ariek* (Tamarundus discolor) was used not only as a fruit but also for medicinal purposes. It was believed to cure stomach ailments and often given to children in the morning before meals for optimal absorption and healing (Salina, O.I., 2022).

Tuyunwo/Ngoswo (Balanites Agyptiaca) was a prevalent plant in Elgeyo Marakwet Kerio Valley ecological zone that sprouted during the dry season in November, December, and January. Its young leaves/sprouts were used as vegetables, while its fruits were stored for use as animal feed during prolonged dry seasons. This tree species was highly valued for addressing various local needs. During dry season, when other cultivated and perennial vegetables were scarce, the leaves of *Balanites Aegyptiaca* became almost the only source of fruit and vegetables boiled and eaten by human beings (Kipn'galech, O.I., 2022). At the same time, its branches were cut and used as feed for goats and cattle to supplement the little grass available (Cherop, 2020). The extensive use of fruits and vegetables from this plant during droughts to suppress the impact of hunger illustrates Elgeyo Marakwet community's adeptness at managing their ecological resources for livestock production and food security.

Key informant interviews revealed that Elgeyo Marakwet women occasionally travelled to Tugen land in search of fruits and vegetables (Cherwon, O.I., 2022; Sigira, O.I., 2022). It can therefore be argued that hunting, gathering of vegetables and fruits, collecting honey, and utilizing ants were critical strategies employed by Elgeyo Marakwet to mitigate food crises.

Table 2.5: Traditional Vegetables and Edible Fruits in Elgeyo Marakwet

Local Name	Botanical name	Type
Kisakaa/Kisaikiat	*Cleome gynandra*	Vegetable
Tilam	*Zizyphus Mauritania*	Fruit
Nderemiat/Ndereme	*Basella alba*	Vegetable
Keliot/Kelio	*Akokanthera schimperi*	Fruit and vegetable
Ililwet	*Sterculia stenocarpa*	Fruit and vegetable
Ngoswo/Tuyunwo	*Balanites agyptiaca*	Fruit and vegetable
Muchukwo	*Berchemia discolor*	Fruit and vegetable
Keibetwet	*Vangueria madagascariensis*	Fruit and vegetable
Lokoiwo/Mokoiwo	*Ficus Sycomorus*	Fruit and vegetable
Tololokwet	*Scherocarya birrea*	Fruit and vegetable
Tamunges	*Uvaria Scheffleri*	Fruit and vegetable
Ariek/Aria	*Tamarundus Indica*	Fruit and vegetable
Chelolo/mbonik	*Physalis peruviana*	Fruit
Chepkarta	*Amarantha viridis*	Vegetable
Bobek/Bobaa	*Termitomyces schimperi*	Vegetable
Kisochot/ kisocho	*Solanum nigrum*	Vegetable

Source: Researcher, 2022

Based on table 2.5, it is evident that the people of Elgeyo Marakwet, through years of experience with various plant species in the area, have developed mastery and appreciation of herbal, nutritional, and food values of their plants. Edible plant roots, leaves, and fruits have always been gathered and used as food throughout marginal areas of Africa (Kisaka, 2009).

Consequently, in Elgeyo Marakwet, which is considered a marginal area, hunting and gathering served to supplement agro-pastoral economy and enhance food security.

In the escarpment and Kerio Valley ecological zones, ant hills have provided termites (*Termes Ballicosus*) (Kipchoge, O.I., 2022). These termites were gathered in April every year in the area. Key informant interview with a clan elder observed that;

> …in pre-colonial period anthills (*tulwo*) were very important and belonged to people individually or as a family or as a clan, and no one gathered termites from one's anthill without permission from him or her or from the clan that owns it, *kon'ga* (termites) were harvested in April each year, harvesting was done at night when there was darkness, a small sizeable hole was dug near the ant hill and fire was lit, the fire attracted the termites which then fell on the dug hole, after enough collection the termites were transferred into a collecting bag made of animal skin (*len'gu*), the gathered termites are then cooked in the homesteads and eaten, and the surplus dried, crashed and mixed with honey and stored for future use or exchanged with grains (Cherwon, O. I, 2022).

From the key informant's submissions, anthills (*Tulwop kon'ga*) were an integral part of the Elgeyo Marakwet society, being culturally recognized as family or clan property. Termites from these anthills were a valuable food source that supplemented livestock and grains during periods of food scarcity. Honey gathered was an important economic activity in Kerio Valley ecological zone and escarpment ecological zone forests (Cherop, 2020).

Honey was mainly utilized as a food preservative, for brewing honey-beer drinks, as food source, and for medicinal purposes (Chebet and Dietz, 2000; Cherop, 2020). During the dry

season, locusts and grasshoppers were killed and eaten as a relish to supplement meagre food resources, especially vegetables and fruits (Mutalal, O.I., 2022). Additionally, Elgeyo Marakwet medicine men and women gathered medicinal plants, including roots, stems, and leaves, which were used as herbs to treat diseases both in humans and livestock (Kipkorir, 1973; Chesang, 1973; Chebet and Dietz, 2000).

Based on the discussions, it can be observed that gathering of wild animals, fruits, and insects in the pre-colonial Elgeyo Marakwet played an important role in sustaining the community during dry seasons when food from livestock and farm produce was scarce. This suggests that the people of Elgeyo Marakwet understood their ecology and seldom suffered from acute food shortages in the pre-colonial era.

2.12 Elgeyo Marakwet Traditional Industries

The pre-colonial Elgeyo Marakwet society engaged in various traditional industries such as iron smelting, pottery, weaving, and basketry (Kipkorir, 1973; Chesang, 1973; Chebet and Dietz, 2000). Ironworking technology (*kito'ng*) among Elgeyo Marakwet was a specialized craft practiced by experts called *Kiton'gik* (blacksmiths) (Sawe, O.I., 2022). According to key informant interviews, iron ore was extracted from iron-bearing rocks and smelted in furnaces using extremely hot fires, which were fueled by leather bellows to achieve the necessary temperatures (Talaa, O.I., 2022).

They processed iron was used to craft a variety of tools, weapons, and ornaments. *Kitongik* (blacksmiths) produced iron tools such as *makombe* (traditional hoe), *chepkeseit* (small knife), *moor* (a traditional farm tool for clearing the bush, and cleaning furrow water systems), *aiywo* (axe), and *moruut* (panga like object). They also created specialized items

like *Kiplon'gin*/*Lon'gnot,* a small bleeding arrow), as well as weapons such as *kotiek* (arrows) and *n'gotit* (spears) that were used for hunting (Sigira, O.I., 2022). *Makombe* was used in digging soil and weeding millet and sorghum, and extracting edible roots. *Chepkeseit* was used for harvesting finger millet and sorghum, while *aiywo* and *moruut* were essential for cutting small trees and clearing vegetation in preparation for cultivation (Koech, O.I., 2022).

The emergence of the ironworkers in the pre-colonial Elgeyo played a crucial role in enabling the community to expand their agricultural and pastoral activities (Tarus, 1994; Chebet and Dietz, 2000; Kipkemei, 2020). The production of iron tools blacksmiths allowed the Elgeyo Marakwet to clear forests to open up land for agro-pastoral production, thus, facilitating them to climb the cliff (moving from the Kerio valley to the highland ecological zone). It also helped in production of livestock bells and various iron weapons for hunting. This advancement significantly bolstered agropastoral economy and food security by providing essential tools for farming, livestock industry and hunting.

In addition to ironworking, the Elgeyo and Marakwet were skilled in various craftworks (Cherop, 2020). They produced *teret* (pots), and baskets such as *lengu*, *milet*, *patanet* using animal skins. They also crafted mortar (*kenut*) (made from a hollowed trunk of a tree), and *moin'gonik* (bee-hives) from logs. Weaving was another significant craft, involving the making of *kerebet* (a cylindrical open-topped container) used for serving *kimyet*, *saina* (cell), *choget* (traditional granary), and *tabut* (ceiling of the hut) (Kop Maiyo, O.I., 2022). These craftworks required well-experienced and skilled men and women who were guided by wisdom and experience (Chebet and Dietz, 2000).

In Elgeyo Marakwet society, pottery was a highly skilled craft predominantly practiced by women, with certain women specializing in this art form (Chebet and Dietz, 2000). The abundance of clay soils in Elgeyo Marakwet region facilitated the production of a variety of pots, each serving different purposes (Kipkemei, 2020). These pots came in various sizes and shapes, tailored to meet the needs of transportation, storage and cooking within the community (Talaa, O.I., 2022).

Different types of pots were crafted for specific uses: *chepsagitit* (small pots) were used to boil herbs, and also to store millet and sorghum seeds, *chebin'guui* (medium-sized pots) were used to cook vegetables while larger pots were designed for transportation and storing water for domestic purposes (Krop, O.I., 2022). *Teretab kimyet* (cooking pot) played a central role in preparing millet and sorghum meal (*kimiet/kimyet*), vital staples in the people of Elgeyo Marakwet diet. Thus, this intricate pottery tradition highlights the role of women in maintaining the household economy and ensuring the community's sustenance.

Traditional structures such as *tabut/tobot* and *kapchoge* served as important storage facilities for harvested grains, pots, gourds (*Sotonik*), and hoes (Cherop, 2020). Gourds were used for storing milk and millet seeds. Gourds were sewn with leather straps for easy transportation of their contents (Chebet and Dietz, 2000; Kipkemei, 2020). Iron tools and craft items also played significant role as commodities for trade (Tarus, 1994). These items provided a basis for trade as items of exchange (Chesang, 1973; Chebet and Dietz, 2000; Kipkorir, 1973).

This integrated approach to traditional industries and agricultural practices underscored Elgeyo Marakwet people's resilience and adaptive strategies in managing their ecosystem and ensuring sustainable livelihoods in challenging environments.

2.13 Pre-Colonial Trade among Elgeyo-Marakwet

The Elgeyo Marakwet communities, like many other Kenyan communities, engaged in barter trade long before 1895, forming well-established local trade links (Chesang, 1973; Kipkorir, 1973; Kipkorir and Kareithi, 2013). This trade was driven by environmental variations and the need to fulfil household requirements that could not be met solely through local resources and skills (Chebet and Dietz, 2000; Cherop, 2020). The people of Elgeyo Marakwet were not entirely self-sufficient and relied on their neighbors, including Tugen, Nandi, Ogiek, and Pokot, for certain goods and services (Busienei, O.I., 2022). This fostered a symbiotic relationship, wherein trade allowed for the exchange of goods and resources, helping mitigate environmental and resource-based limitations.

Trade relations were established between Keiyo and Somalia (Tarus, 1994; Cheserek et al., 2013). Keiyo exchanged ivory and hides acquired through hunting of elephants for Magadi soda (sodium carbonate) from Somali traders (Cheserek *et al.*, 2013). Oral interviews indicate that Keiyo used Magadi soda in tobacco preparation (Kop Maiyo, O.I., 2022). Consequently, Somali procured cooking pots and gourds from the Marakwet (Chebet and Dietz, 2000). According to Ogot (1976), the irrigated settlements at the base of Kerio Valley provided surplus grains to trade caravans. This suggests that these irrigated settlements were likely established by the Marakwet people, who engaged in irrigation practices in Kerio Valley ecological zone.

Key informant interviews assert that famine accelerated close contact between the people of Elgeyo Marakwet and her neighbors (Kipkore, O.I., 2022). Chesang (1973) concurs with this view, noting that during the pre-colonial famines, many Keiyo migrated westwards across the escarpment to Nandi in search of food. An FGD session conducted at Rokocho shopping

centre in the year 2022 revealed that during severe famines in the pre-colonial Elgeyo Marakwet, families sometimes bartered their children with Nandi women to obtain grain. In Kerio Valley (*keu*), the people of Elgeyo Marakwet engaged in reciprocal trade with their counterparts in the highlands (*Mosop),* exchanging items for gifts such as honey, soda ash, salt licks, and goats (Cheserek, O.I., 2022). These commodities were readily available in Kerio Valley. This interdependence enabled those inhibiting highland Elgeyo Marakwet to receive these items, which were often given rather than sold, in exchange for reciprocal gifts during food shortages (Chebet and Dietz, 2000). Informants noted that such exchange functioned as form of insurance during drought and famine for those living in Kerio valley ecological zone (Kop Maiyo, O.I., 2022).

The Elgeyo and Marakwet had trade ties with their neighbors, mainly the Pokot, Ogiek, and Tugen. Marakwet exchanged millet and sorghum for honey with the Keiyo. In their exchanges with Ogiek, Keiyo obtained honey, herbs, weapons, and beehives, while Ogiek received grains and pots in return. Marakwet also exchanged millet and sorghum for milk and meat with Pokot. Similarly, Keiyo obtained milk and meat in exchange for sorghum and millet. This trade, characterized by relatively small volumes, and was particularly active during times of food crisis, with widespread participation (Kipchoge, O.I., 2022).

The pre-colonial trade was mainly a part-time activity and was most intense during the dry season, when agricultural activity was minimal and during periods famine (Muriuki, 1974; Ndege, 1990). Key informant interviews concurred that in the pre-colonial Elgeyo Marakwet, trade involved only a few numbers of participants and had regular market days (Mary, O.I, 2022; Kimoi, O.I., 2022). People in need of specific household items, including food, would visit homes of those who possessing the desired goods to conduct exchanges. Thus, trading

activities facilitating the acquisition of essential items and enhanced food security. This trade was significant during ecological disasters or famines.

Trade ties in most pre-colonial societies arose to address the complementary needs of neighboring communities, which were in close proximity to each other. It was a form of production strategy to have access to the required goods (Hopkins, 1973). Household produced food not only subsistence but also as surplus to sustain themselves during disasters such as prolonged droughts. In the absence of food crisis, surplus food was traded to obtain other products (Omwoyo, 1990; Kisaka, 2009). Thus, trade satisfied needs for grains, livestock and livestock products.

Based on the discussions, it can be submitted that the pre-colonial Elgeyo Marakwet had indigenous knowledge of their ecological set up, which fostered the philosophy of taking and giving back. This knowledge enabled them to establish trade ties among themselves and with their neighbors such as the Pokot, Tugen, Okiek, and Nandi. Through these ties, they acquired food items they lacked and exchanged their surpluses. This approach was rooted in their deep understanding and mastery of local ecology for food production and food security strategy within pre-colonial Elgeyo Marakwet community.

2.14 The Role of Elgeyo Marakwet Women in Food Production

In majority of the world, women have traditionally been responsible for farm work and related domestic food production (Tiondi, 2001; Kisaka, 2009; Wangari, 2010). In the pre-colonial African societies, women were socialized to play a significant role in food production, often utilizing simple tools like iron hoes (Wangari, 2010; Nzioki, 1982; Gordon, 1996; Wangari, 2010). In Africa, women contribute significantly to agricultural sector through cultivation, weeding, harvesting, and transportation of farm produce (Moore, 1986).

In Sub-Saharan Africa, women are responsible for approximately 80% of food production (Boserup, 1998). Thus, women's role in achieving food security in Africa was highly significant (Okuro, 2002; Jalan'go-Ndeda, 1991). Women's contributions are essential to household food security (FAO, 2009). Among pastoral societies, such as Maasai of East Africa and Fulani of West Africa, women were also integral to food production, particularly in milking cows and producing butter (Henn, 1984). People of Elgeyo Marakwet were no exception to these social norms, as women were tasked with producing sufficient food for both family consumption and storage to safeguard against famines.

Culturally, the pre-colonial Elgeyo Marakwet women were revered as givers of life and sustainers of both social and economic life of the family and community (Chebet and Dietz, 2000). Men heavily relied on women as reproducers of labour force, which was essential for providing family's basic needs for consumption, such as food. In the pre-colonial Elgeyo Marakwet society, women were actively involved in gathering wild fruits and vegetables, fetching firewood, and taking care of their children (Moore, 1986; Chesang, 1973). Hennings (1951) while traversing through the Keiyo region, observed that Keiyo women were responsible for all the domestic work and millet and sorghum cultivation. These activities highlight the central role of women in agro-pastoral production.

Women's close interaction with the environment has often made it possible for men and children to rely on women for their feeding (Rau, 1991). Traditionally, women have had an intimate relationship with their natural environment, leading to their role as environmental stewards (Kiage, 1998). This role is evident in activities such as water collection, fetching firewood, and agricultural cultivation (Wangari, 2020). Among the Elgeyo and Marakwet,

women not only served as primary food producers but also retained control over distribution and consumption of their produce (Chebet and Dietz, 2000; Kipkorir and Kareithi, 2013; Cherop, 2019). This dual role underscores the significant influence and autonomy that women excised within their households and communities in the pre-colonial times.

In the pre-colonial Elgeyo Marakwet, agropastoral economy was characterized by basic traditional industries, with women mostly specialized in pottery (Chebet and Dietz, 2000). Women crafted pots from readily available black and red clay, molding the clay into desired shapes, drying them in the sun, and finally hardening them in a kiln. These pots were used to store grains, seeds, and water. Such industry and art relied on available local resources (Chebet and Dietz, 2000). The storage of grains and seeds in these pots ensured sustainable food production, thus contributing to food security.

Among the Elgeyo Marakwet, women acquired rights to land for cultivation through marriage (Kipkorir and Kareithi, 2013). Men provided land for cultivation to support their families, while women and their children supplied the necessary labour (Kipkore, O.I., 2022). As patriarchal society, Elgeyo Marakwet men owned land used for food production (Kipkorir and Welbourn, 2008). They also distributed land to their sons upon marriage through inheritance, to enable them to produce food for their families. While women did not own livestock, they played a crucial role in utilizing milk to nourish their children. Hobley (1967) observed that, in African communities, women were generally not permitted to own livestock, although they had the power to use milk for their children's sustenance.

Married women among the Elgeyo and Marakwet maintained a small vegetable garden within their huts known as *Kabungwui* (Kipkemei, 2020). These gardens were individually owned

and cultivated by women who had full autonomy over what and when to plant (Talaa, O. I., 2022). Common vegetables grown in *Kabungwui* included *Kisaka* and *kisicho* (Kop Maiyo, O.I., 2022). The garden also housed calabashes used to make vessels such as *Sotet* for storing milk and finger millet seeds. Women cultivated a variety of crops in this garden (Chebet and Dietz, 2000). Although women did not have inheritance rights, they had unquestionable access to *Kabungwui* land for agricultural use (Kipkemei, 2020; Cherop, 2019). This autonomy in cultivating *Kabungwui* reflects women's significant role in household food production.

In the pre-colonial Elgeyo Marakwet, women also engaged in a wide range of farm work including burning cleared land, digging (*temisyo*), sowing and raking in seeds, gathering debris, hand weeding, harvesting, stacking and carrying harvest, threshing, pounding, winnowing, and grinding (Sawe, O. I., 2022). Additionally, every woman maintained her own grain store (*Kapchogop korgo*) (Chebet and Dietz, 2000; Kipkorir and Welbourn, 2008; Kipkorir and Kareithi, 2013; Cherop, 2020). This underscores the hard work women put into agricultural production to ensure their household were well-fed. It is clear that most of the agricultural activities in the pre-colonial Elgeyo Marakwet were performed by women.

However, an FGD session with women elders conducted at Chebiemit shopping centre in the year 2022 revealed that, despite their dominant role in farming, women had little or no authority in managing the farmland. They were also excluded from decision-making processes and were not allowed to sell livestock, farm produce, or exchange other commodities without their husband's consent. Women were only permitted to sell or exchange goat milk for other food items.

In Kerio Valley ecological zone, women were forbidden from diverting furrow water to their crop fields (Kipkorir and Welbourn, 2008; Kipkorir and Kareithi, 2013). Cultural beliefs considered menstruating women unclean and therefore prohibited from coming into contact with furrow water, as it was believed to cause leakage and structural breakage of irrigation systems (Kipkorir and Welbourn, 2008; Kipkorir and Kareithi, 2013; Cherop, 2020). Windowed women often paid men to maintain furrows during such periods to enable them get furrow water for irrigation, as contravention of these taboos was believed to cause miscarriages and infertility (Kipkorir and Welbourn, 2008; Cherwon, O.I., 2022). These furrow taboos disadvantaged single, divorced, separated, and widowed women by limiting their ability to utilize furrow water for agro-pastoral production. Thus, the capacity of Elgeyo Marakwet women to produce irrigated food crops for their households was highly constrained.

Based on the discussion, it is evident that Elgeyo Marakwet women played a pivotal role in sustaining agro pastoral economy, which was crucial for household food production and food security. Despite being excluded from land control and ownership due to cultural traditions, such as restrictions on agricultural and pastoral activities that ensured the well-being and survival of their families.

2.15 Environmental Conservation

In Elgeyo Marakwet, land was apportioned according to the needs of the community to provide for the various needs (Kipkorir, 1973; Chebet and Dietz, 2000). Portions of land were designated for sacred worship sites and public shrines (Justine, O.I., 2022). Trees were revered as sources of water and it was considered taboo to cut down specific trees such as *Sosia* (palms), which grows near water sources and along rivers and streams, and *Mokoiwo*

(sycamore), which provided food (fruits) during dry season (Cherop, 2020). These practices aimed to ensure continued availability of rainfall, essential for agro-pastoral production and food security. Firewood was collected only from fallen tree branches as opposed to cutting down trees (Mutalal, O.I., 2022). Thus, this highlights community's commitment to ecological conservation.

Cutting down live trees, especially along river banks and streams, was strictly prohibited in Elgeyo Marakwet land and considered a destructive act. Those found guilty of such offenses faced severe penalties, including a fine of a goat and 2 kilograms of honey (Kipkore, O.I., 2022). Moreover, offenders in Kerio valley-Marakwet, were barred from using indigenous furrow waters for irrigation on their farms for a specified period (Cherop, 2020). These measures were implemented to protect trees regarded as sources of rivers and streams. This was to ensure continuity in food production through use of furrow waters. Cutting trees along the rivers risked causing disasters or dry up of streams (food insecurity) (Titus, O.I., 2022). Thus, the pre-colonial Elgeyo Marakwet community's preservation of these trees was a significant ecological conservation measure for continued supply of water for food production and food security.

Acacia totolis (*sesia*) and Balanites agyptiaca (*tuyunwo*) were valued fruit-bearing trees that were protected from being cut down (Cherop, 2020). Clans or individuals who had these trees on their farms were only expected to prune them during planting season (Sawe, O.I., 2020). Acacia pods, locally known as *sakaram*, were collected during June, November and December and stored to feed animals during the dry spells. Additionally, *sakaram* served as food source for humans during periods of extreme famine (Kenneth, O.I., 2022).

The Elgeyo Marakwet community was strictly forbidden from cutting and using "milk trees'' or ‘‘the trees of women’’ (trees that contain white latex) as firewood or for any other purpose (Kop Maiyo, O.I., 2022). It was believed that when such a tree is cut, it cries ‘milk', and the flowing "milk" symbolizes disaster (Cherwon, O.I., 2022). Cherop (2020) opines that these trees grew taller than any other tress in Arror ward in Marakwet. key informant interviews revealed that the tall ‘milk’ trees represented abundance and prosperity among the Elgeyo Marakwet (Cherwon, O.I., 2022). Among these trees were *Simotwo* (*Ficus natalensis*) and *Mokoiwo* (*Ficus sycamores*). *Mokoiwo* bore nutritious fruits that were sweet when eaten with their seeds and was considered the most sacred of all trees to the Kalenjin (Sigira, O.I., 2022).

The sacredness attached to these trees is evident; key informant interviews stated that *ilat* (god of rain) is believed to be present in *Simotwo* and *Mokoiwo* trees (Chemuok**,** O.I., 2022). As a result, accidental disturbance of these tree species was rare. Observation of some of the few individual trees in the study area showed that they were quite old. Furthermore, it was observed that should anyone cut down these sacred trees, custom dictated that a black goat was to be sacrificed and its intestines smeared on the wound of the tree in question. The clan elders would bless the culprit; failure to do so, misfortune will strike his/her family (Chepkon’ga, O.I., 2022). Thus, community’s restriction against cutting such sacred trees enhanced ecological conservation and preservation of water catchments essential for agro-pastoral production.

The pre-colonial Elgeyo Marakwet community also practised shifting cultivation (Moore, 1986; Tarus, 1994). When land fertility declined, farmers would move their production to virgin land, allowing the previous used land to gradually regain its fertility. This practice helped curb soil erosion and maintained soil fertility for crop production (Critiley, 1982). By

moving to virgin land, the community ensured significant increase in crop production, hence food security.

During seasons with poor rainfall, the community cultivated millet and sorghum along escarpments, ledges, and river valleys of River Kerio (Cherop, 2020). To curb soil erosion in agricultural fields, they built traditional ridges using small tree trunks, branches, and moveable small stones that were arranged vertically across the cultivated land (Moore, 1986). This practice reduced water run-off, hence preventing washing away of the top fertile soils essential for increased millet and sorghum production.

The pre-colonial Elgeyo Marakwet community also practised intercropping (Arap Msafiri, O.I., 2022). This method, involved cultivating vegetables, sorghum, and millet together, thus addressed both needs of the local people and challenges of their fragile environment. First, intercropping helped prevent soil erosion by providing crop cover that reduced the risk of deep soil being washed away by runoff water. Second, soil fertility was preserved through multiple cropping, as different plants had varying and complementary nutrient requirements and were rooted at different depths, ensuring optimal use of soil moisture and nutrients. Third, intercropping reduced spread of pests and diseases, as neighboring plants were less likely to be of the same species.

They also practiced seasonal livestock movement (Cheserek et al., 2012; Cheserek, 2013; Cherop, 2020). During the dry season, they grazed their livestock in the escarpment ecological zone during the dry season, where pasture was available and in Kerio Valley ecological zone during the rainy season (Chesang, 1973). Key informant interviews indicated

that this practice aimed to reduce overgrazing sustain livestock economy, and contribute to environmental conservation (Sigira, O.I., 2022).

Based on the discussions, the people of Elgeyo Marakwet employed a variety of innovative, effective, and unique indigenous knowledge approaches to environmental conservation and social safeguards. These methods included shifting cultivation, conservation of sacred trees, intercropping, and seasonal grazing of livestock between the escarpment and Kerio Valley ecological zone. Such practices ensured land was never left completely bare of vegetation cover to warrant irreversible land degradation. These strategies collectively contributed to conserving ecology for agro-pastoral production and the maintenance of food security.

2.16 Summary

This chapter has examined origin, migration, and settlement of the people of Elgeyo Marakwet, with a particular focus on the pivotal role of their agro-pastoral economy. It has also analyzed the intricate pre-colonial interplay between the Elgeyo Marakwet's agro-pastoral practices and their ecological environment, especially in relation to food acquisition and production. The Elgeyo and Marakwet communities engaged in livestock keeping and crop cultivation, meticulously adapting these activities to the specific ecological conditions of their region.

In addition to these practices, they supplemented their sustenance through hunting and gathering. Traditional granaries were constructed to store harvested crops and preserve seeds, while sophisticated irrigation furrows were developed in the Kerio Valley-Marakwet region to facilitate crop irrigation and provide water for livestock. Moreover, they implemented a

system of livestock leasing to relatives or associates as a risk mitigation strategy against potential losses from disease outbreaks or cattle rustling.

The community also engaged in barter trade for foodstuffs, both within their own society and with neighbouring communities, and practiced food preservation techniques to ensure sustenance during the dry season. Raiding was also employed as a strategy to replenish livestock herds following environmental stressors such as droughts or disease outbreaks. These pre-colonial strategies were carefully crafted to secure food stability through a profound understanding and deliberate management of their ecological environment.

CHAPTER THREE
COLONIALISM AND TRANSFORMATION OF ELGEYO MARAKWET AGRO-PASTORAL ECONOMY AND ECOLOGY, 1895 -1963

3.1 Introduction

This chapter examines transformation of the Elgeyo Marakwet ecology and its impact on agro-pastoral production and food security during the colonial period. Prior to the colonial rule, the people of Elgeyo Marakwet engaged in agro-pastoralism, raising cattle and goats, and cultivated sorghum and millet, among other socio-economic activities. However, with the establishment of colonial rule between 1895 and 1963, various colonial policies were implemented to gradually modify and change the indigenous agro-pastoral economy. These policies include land alienation and settler squatter systems, wage labour and tax policies, introduction of new crops, Second World War, and seizure of livestock. These measures restructured and altered Elgeyo Marakwet ecology and agro pastoral economy.

3.2 The Establishment of Colonial Rule in Elgeyo Marakwet

European colonialism began to penetrate Africa in the eighteenth century, reaching East Africa, including Kenya, in the nineteenth century (Kanyinga et al., 2000). The partition of East African region has been extensively documented by Burke (1970) and Brett (1973), among others. European interest in East Africa predated the scramble and partition of the region (Burke, 1970; Brett, 1973; Wolff, 1974). The British, in particular, were interested in Uganda initially due to its significance as the source of the Nile, which was crucial for their strategic interests in Egypt, and later for its strategic and economic potential (Okoth-Ogendo, 1990).

Uganda was declared a British protectorate in 1894 (Gordon, 1946; Okoth-Ogendo, 1990). The eastern boundary of this protectorate extended to Rift Valley area, which is currently in Kenya (Omwoyo, 2004). This region is where Elgeyo Marakwet County is presently located. Kenya was annexed to secure a safe passage from the Indian Ocean port of Mombasa (Kenya) to Uganda, which eventually gained importance due to its abundant natural and economic resources (Omwoyo, 2004). These resources included relatively fertile agricultural lands with adequate rainfall (Omwoyo, 2004; Wolff, 1974; Ndege, 1987).

The transformation of Kenya into a colonial state and the establishment of a colonial administration commenced in 1895 (Okoth-Ogendo, 1990; Tarus, 1994; Omwoyo, 2004; Kisaka, 2009). Kenya was declared a protectorate in 1900, with Sir Charles Elliot appointed as the commissioner of the East Africa Protectorate (Tarus, 1994; Kisaka, 2009). Elgeyo Marakwet were first visited by a European in 1883, when Joseph Thompson crossed Chebloch Gorge in Kerio Valley from Maasai land through Baringo to Tambach in Elgeyo and then Kapsowar in Marakwet (Hennings, 1951).

Similarly, Tarus (1994) and Chebet and Dietz (2000) note that after the British subdued the Nandi, they advanced to Tugen and established a station at Eldama Ravine in 1895 under the command of a white officer named Ernest Smut. From this location, they administered Elgeyo Marakwet region (KNA, DC/UG/2/1, 1909–1933). Therefore, it can be inferred that early European penetration into Elgeyo Marakwet territory seems to have started around 1895. Chebet and Dietz (2000) submit that the area was administered from Eldama Ravine due to strong resistance encountered by the British from Elgeyo and Marakwet communities.

When the British attempted to subdue Keiyo, approaching from the south through Metkei and Kipsaos areas with the assistance of the Tugen, they encountered vigorous opposition, leading to confrontation (Tarus, 1994; Chebet and Dietz, 2000). This confrontation is locally referred to by the Elgeyo as *Kipkoima*, meaning long fire, due to use of firearms against the Keiyo (Chemuok, O.I., 2022)**.** Simultaneously, on the same day, British camp was struck by lightning, compelling both the British and the Tugen allies to retreat hastily back to Eldama Ravine (Tarus, 1994; Chebet and Dietz, 2000). After facing resistance when attempting to gain entry to Elgeyo Marakwet from the south, the British opted to approach from the north (Marakwet). Despite this shift in strategy, they faced another setback (Chebet and Dietz, 2000). It was not until 1909 that an extensive survey was conducted by colonial officials from Eldama Ravine to consolidate colonial authority (Chebet and Dietz, 2000). In 1910, Elgeyo Marakwet came under colonial rule. The British utilized existing administration frameworks by appointing elders as headmen with the responsibility of collecting taxes and enforcing colonial governance (Tarus, 1994). However, the area remained administered from Eldama Ravine under a Paramount Chief.

In 1912, British established their first administrative station at Kapsowar in Marakwet (DC/ELGM/1/1, 1912–1920). This station served as the centre of administration for the Marakwet (Tarus, 1994). In 1919, another station was established at Kamariny specifically for administering Keiyo (KNA, DC/ELGM/1/1, 1912–1920). Thus, by 1920, colonial state had firmly established control in Elgeyo Marakwet. In 1927, Kamariny station was moved to Tambach. It was here that a decision was taken by the colonial government to administer both Keiyo and Marakwet districts jointly, thus the adoption of the name Elgeyo Marakwet district (KNA, DC/ELGM/1/1, 1912–1920). This historical administrative pattern is supported by the Elgeyo Marakwet District annual report, which documents that Elgeyo Marakwet District has

been variously administered at various times in history from Eldama Ravine, Kapsowar, Kamariny, and Tambach (KNA, DC/ELGM/1/1, 1912–1920).

3.3 The Colonial Land Tenure Reforms and Emergence of Squatter System among the Elgeyo Marakwet, 1895-1939

Historians have established that most communities in Kenya did not own land as private property during pre-colonial period (Tarus, 1994; Omwoyo, 2004). Elgeyo and Marakwet are not exceptions to this reality. Elgeyo Marakwet land was owned communally, with various regulations dictating how various resources were used and managed. The pre-colonial system of land ownership was aimed at producing enough food for the community within a well-managed ecology. Systems of land ownership and food acquisition are interrelated with ecology in such a way that, in most of this period, food shortages were infrequent. The fundamental unit of production among Elgeyo Marakwet in the pre-colonial period was clan land, which cut across Kerio valley, escarpment, and highland ecological zones.

Before the establishment of colonial rule, Elgeyo Marakwet community had inhabited highland ecological zone around 1850. They grazed their livestock as far as Uasin Gishu Plateau in the pre-colonial period (Massan, 1968; Tarus, 1994). Highlands of Elgeyo Marakwet had always been the most favorably situated of the three ecological zones with respect to ecological productive potential. Ample and predictable rainfall ensured both good crop production and abundant pasturage for the livestock economy (Chan'gach, 2015; Tarus, 1994; Kipkorir, 1993). However, prior to the establishment of colonial rule, utilization of highland ecological zone by the people of Elgeyo Marakwet was constrained by grazing competition from the Maasai, Karamoja, and Nandi communities (Massan, 1968). Following the decline of Maasai power due to livestock epidemics towards the end of the nineteenth

century, the people of Elgeyo Marakwet were able to take advantage of the highland ecological zone (Massan, 1968; Tarus, 1994; Chebet and Dietz, 2000; Chan'gach, 2018). Unfortunately, this newfound prosperity was short-lived as land and tenure that constituted a very important factor in agro-pastoral production was replaced with new colonial land tenure.

In the colonial period, the process of land alienation was undertaken without regard to existing indigenous socio-economic, ecological management, and other organizational structures in Africa (Leys, 1975; Rodney, 1972; Esese, 1990; Tarus, 1994; Omwoyo, 2002; Okuro, 2002; Karigi, 2015). Land access among African communities was severely impacted by colonialism, driven by industrial revolution's demand for resources (Omwoyo, 2004). Colonial state set up various mechanisms to dispossess Africans of their land. This was to boost the settler economy and provide raw materials to British industries (Brett, 1973).

Communal land was often treated as unoccupied land by the colonial state (Kisaka, 2006; Wasike, 2018). Sir Charles Elliot declared all "unoccupied land as 'wasted land' and introduced the Crown Land Ordinance in 1902 (Omwoyo, 2004; Kisaka, 2009; Okoth-Ogendo, 1990; Mungeam, 1976). This ordinance laid down that no native had any right of land ownership and dismissed African land tenure as non-existent, and African claims to land were only recognized as occupied (Okoth-Ogendo, 1990; Omwoyo, 2004; Kisaka, 2009). Omwoyo (2004) and Kisaka (2009) argued that such misconceptions were often used by colonial state to rationalize expropriation of African land, including among Keiyo and Marakwet. Additionally, this ordinance allowed the government to sell or lease land to European settlers, providing them with land for plantation agriculture and generating revenue to fund Uganda railway and for administration of the colony (Okoth-Ogendo, 1990; Wangari, 2010; Wasike, 2018).

Kenya highland was suitable for white settlement and economic exploitation (Wangari, 2010). The Crown Land Ordinance introduced in 1915 facilitated colonization of Kenya highlands by Europeans (Brett, 1973). This Ordinance designated highlands exclusively for the white settlers, effectively dispossessing Africans of their ancestral lands (Mungeam, 1979; Okoth-Ogendo, 1990). Okoth-Ogendo (1990) noted that the first land regulation that permitted Europeans to own land was Land Regulation Act of 1897, which authorized the government to issue a certificate of occupation and 99-year land leases. The dispossession of Keiyo land commenced following the signing of an agreement between the colonial administration and E.M.S. Grogan Ltd. (Tarus, 1994; Chebet and Dietz, 2000). The agreement read:

> "…to grant a lease of all that piece or parcel of land near Eldama Ravine comprising 64,000 acres or thereabouts of forest, including all rights that were supposedly preserved for the Elgeyo (KNA/DC/ELGM/5/1/3, 1921–56)".

This meant that Elgeyo Marakwet community lost their rights to land ownership, particularly in the highland ecological zone, which was deemed ecologically suitable for white settlers and settler farming. This ecological zone was suitable for a mixed economy of crop cultivation and pastoral activities. According to Tarus (1994) and Chebet and Dietz (2000), Keiyo people, being a preliterate society and unaware of the details of the lease, did not appreciate the existence of conditions under which their land was leased to E.M.S. Grogan Ltd. Oral interviews with key informants revealed that early European settlers expanded from Uasin Gishu Plateau to Keiyo-Marakwet highland ecological zone, which was ecologically ideal for livestock and crop production (Ruto, O.I., 2022; Sawe, O.I., 2022). Thus, land alienation among Elgeyo Marakwet started with the advent of European penetration in the area.

Around 1920, white settlers (W.F. Van Breda, Major Arnold, John de Waal, and Jan Van Rensburg) began migrating to Elgeyo Marakwet highland ecological zone at an alarming rate to exploit the area's ecological and economic potential, which was well-suited for agro-pastoral production (Groen, 1974; Tarus, 1994). This influx led to conversion of forested acres of clear-cut lands for large-scale agriculture on plantations and ranches to support cash crop and livestock production (Tarus, 1994; Chebet and Dietz, 2000). It is due to this fact that the period after 1920 witnessed significant land alienation, with Europeans seizing large tracks of fertile land in Kenya (Brett, 1973; Omwoyo, 1992; Dilley, 1937).

Between 1922 and 1923, Keiyo were forcibly evicted from 656 square miles of forest, which was alienated to E.S.M. Grogan Ltd (KNA/DC/ELGM/1/1, 1920–1927). Elgeyo Marakwet communities living in areas such as Chebiemit, Cherangany, Kapcherop, Kapchemutwa, Kamariny, Kaptagat, and Chepkorio were evicted between 1922 and 1923 to create room for white settlement (KNA/DC/ELGM/1/1, 1920–1927). The area of grazing left to them in keiyo area was approximately 72 square miles, was too small to allow ecological conservation practices such as shifting cultivation, fallow farming and seasonal rotational grazing, thus, quickly became overcrowded, resulting in ecological degradation, outbreaks of diseases, reduced livestock and crop production (Tarus, 1994). Keiyo people vehemently opposed loss of their grazing land and demanded its return (Breen, 1976; Tarus, 1994; Chebet and Dietz, 2000).

Historians assert that alienation of land among many Kenyan communities was the primary source of conflicts between Europeans and Africans (Zeleza, 1986; Kanogo, 1987; Essese, 1990; Omwoyo, 1992; Maloba, 1993; Okuro, 2002; Cokumu, 2002). Thus, Keiyo's first

reaction against expropriation of their land was very violent and fatal (Tarus, 1994). However, in about 1924, colonial administration drove Keiyo out of the highland ecological zone with their livestock to the reserves and escarpment ledges (Massan, 1968). Similarly, Marakwet were removed from Cherangany, Embobut and Kipkunur forest blocks. This constrained their access to natural resources for their agro pastoral economy, particularly livestock economy (Cherop, 2019).

By mid-1920s, substantial portion of land in highland ecological zone in Elgeyo had been alienated and occupied by white settlers (Tarus, 1994; Chebet and Dietz, 2000; Sawe, O.I., 2022). Highlands, extending to the edge of Keiyo escarpment, were designated as white man's land. Consequently, the pre-colonial land tenure system, which regulated use of land by Elgeyo Marakwet community, was supplanted by the European land tenure system enforced under European law's property. It was declared that no permanent native villages would be allowed on the top of the escarpment (Highlands) (Tarus, 1994; Chebet and Dietz, 2000). This effectively displaced indigenous community from majority of their land and disrupted their traditional agro-pastoral lifestyle.

In late 1920s, in an expression of ecological dominance, settlers extended their control beyond water and salt resources crucial to the people of Elgeyo Marakwet (Tarus, 1994). A Focus Group Discussion (FGD) conducted at Tambach shopping centre in the year 2022 revealed that white settlers who had alienated land in Uasin Gishu plateau expanded into the Elgeyo Marakwet highlands, establishing large farms around Sergoit Rock. At the foot of Sergoit Rock was a lake fed by four major rivers, with one running out, which was essential to Elgeyo livestock economy (KNA, DC/TAMB/2/10/8, 1929–1956). Thus, Elgeyo

Marakwet people lost access to their ng'enda (salt lick), water source at Kipkabus, and Sergoit rock, significantly impacting their agro-pastoral economy.

By 1930s, land traditionally claimed by the Elgeyo in the highland ecological zone had been leased for 999 years to the white settlers (Tarus, 1994). As a result, Land Regulation Act of 1807 and Crown Land Ordinance of 1902 confined Elgeyo Marakwet people in Kerio Valley and escarpment ecological zones, leaving them with no opportunity to access Elgeyo Marakwet highland zone in the early twentieth century, which was ecologically suitable for both crop and livestock production.

The expansion of cropping and livestock activities in such fragile ecosystems, coupled with the settlement of families in the same areas characterized by unreliable rainfall and low crop production, exposed Elgeyo Marakwet people to recurrent ecological disasters, food shortages, further complicating issues related to ecological management and conservation, agro pastoral economy and food security (KNA/DC/TAMB/1/2/1, 1933–46). Moreover, these activities contributed to environmental degradation (KNA/DC/TAMB/1/2/1, 1933/46). Similarly, the Elgeyo Marakwet herders were permanently restricted to Kerio Valley and escarpment ecological zones, where their livestock suffered from diseases such as rinderpest, East Coast Fever (*cheptigon*) and anthrax (*kiborom*) (Cherwon, O.I., 2002). This resulted in decline in livestock numbers, which could have otherwise thrived on grazing lands available during the pre-colonial period.

It is noteworthy that Kerio Valley ecological zone, Escarpment or Hanging Valley ecological zone, and some parts of Elgeyo Marakwet highland ecological zone, particularly Marakwet, was not subject to land alienation. This was mainly because this area was not attractive to the

settlers due to its rugged terrain, thick forest, and that it was far from the railway line in Uasin Gishu (Cherwon, O. I., 2022; Kirop, O.I., 2022; Suter, O.I., 2022). Equally, this area was not inhabited by the people of Elgeyo Marakwet due to presence of thick forest (Ruto, O.I., 2022). This assertion is well captured by DC Elgeyo Marakwet District 1933, who wrote that;

> In general, appearance of Kerio Valley floor is huge patches of thick, dark bush with muddy brown water from Kerio or Endo River flowing down the centre and forming the boundary between the two districts (Elgeyo Marakwet and Baringo). Malaria, tsetse fly, drought, and subsequent lack of an economic system of land cultivation meant that the valley was uninhabited and uninhabitable by humans and livestock (KNA/DC/ELGM/1/3/1933–1937).

Based on the Elgeyo Marakwet annual report, 1933-1937, Kerio Valley ecological zone remained unalienated by Europeans since the area was bush-covered terrain and various impediments to human settlement and agricultural development (KNA/DC/ELGM/1/3/1933–1937). Wangari (2010) opined that many European settlers preferred areas closer to the railway line. However, these areas (Kerio valley and escapement ecological zone) were designated as “Keiyo Reserve” and “Marakwet Reserve” (Chebet and Dietz, 2000; Ruto, O.I., 2022). The original reason for the establishment of reserves in colonial Kenya was to facilitate European settlement (Huxley, 1935).

A buffer forest reserve was established to prevent the people of Elgeyo Marakwet from interacting with settlers in the highland ecological zone (Tarus, 1994; Ruto, O.I., 2022). Creation of Elgeyo and Marakwet reserves effectively prevented the two native communities from acquiring land rights elsewhere, as it restricted migrations into new frontier lands,

particularly fertile highland ecological zone. In addition, these reserves were not demarcated, leaving them vulnerable to further alienation in future (KNA/DC/ELGM/1/3, 1933–1937).

In the reserves, the Elgeyo Marakwet community cleared bushy areas for crop cultivation, leading to frequent soil erosion, decreased soil fertility and perennial food shortages. Traditional forms of food production, which were closely tied to their understanding and management of their local ecology, gradually disappeared. Additionally, overcrowding and overstocking in the Elgeyo Marakwet reserves also led to overexploitation of natural resources, contributing to ecological disruption and transformation (Chesang, 1973). Significant overstocking was reported in Kerio Valley and Cherangany Hills (Chebet and Dietz, 2000). Thus, it can be argued that settlers and colonial government intentionally imposed ecological landscape dominance on Elgeyo Marakwet people in order to marginalize or displace them by alienating their economically suitable highland ecological zone.

By this logic, ecological dominance was not only a source of economic resources for settlers but also a means to destroy pre-colonial agro-pastoral economy and food security. Thus, it can be submitted that Crown Land Ordinance Act had a great impact on indigenous Ecological management practices and Elgeyo Marakwet agro-pastoral economy. It replaced the pre-colonial communal land tenure with individual land tenure, resulting in forced displacement of indigenous people, disruption of their ecological and agricultural production systems, and loss of free-range grazing land for their animals. Esese (1990) and Tarus (1994) noted that any change in the system of land ownership directly affects crop production and livestock production systems.

Colonial land alienation, therefore, rendered the Elgeyo Marakwet community vulnerable to ecological disasters and food shortages despite their favorable highland ecology

(KNA/DC/ELGM/1/3, 1933–1937). As a consequence, many households in Elgeyo Marakwet struggled to secure essential resources for household reproduction as agro-pastoral activities and other socio-economic activities proved ecologically unsustainable in the escarpment and Kerio Valley ecological zone (KNA/DC/ELGM/1/3, 1933/1937). This situation forced Elgeyo Marakwet people to become squatters on European farms. Esese (2009) posited that one of the first challenges faced by Africans in the reserves was food shortages.

It is worth noting that with colonial land alienation of Elgeyo land by E.M.S. Grogan Concession Ltd, Elgeyo people could not comfortably meet their agro-pastoral economic needs without facing undue pressure from land shortages and ecological disruption. Consequently, Keiyo and Marakwet, like the Kikuyu, found it necessary to resort to squatter labour (Kanogo, 1987; Tarus, 1994). They lived as squatters as a way of obtaining pasture for their livestock (KNA DC/ELGM/1/1/1931-1932). Those recruited as squatters were typically individuals with smaller herds of cattle (Tarus, 1994).

Key informant interviews revealed that settler farmers employed this strategy in order to reduce grazing stress on their farms (Chemuok, O.I., 2022). As a result, Elgeyo Marakwet agriculture suffered from lack of adequate labour, preventing it from developing at par with settler agriculture, as many people concentrated on working as squatters on settler farms at the expense of their own agro-pastoral production. In Keiyo highland ecological zone, some settlers were arrogant and could not retain their squatters for long, and as a result, most squatters disserted (Tarus, 1994). In response, Tribal Police were employed to arrest deserters (Chebet and Dietz, 2000).

In addition, Tarus (1994) observed that one settler by the name of C.D. Cullen, who owned a farm near Kipkabus, gained notoriety for his severe treatment of squatters. In fits of anger, he would shoot at cattle belonging to his squatter, destroy their farms, and set his dogs to maul them. Reports even indicate that Cullen shot his squatter's cow when Elgeyo people attempted to burn his house and wheat stacks (KNA/DC/TAMB/27/2). C.D. Cullen dismissed all the squatters on his farm, and accused them of tardiness and being lazy, and described them as the "most useless labour in the whole of Kenya" (KNA/DC/TAMB/27/2).

Similarly, Wellwood, a settler at Kaptagat, also denied squatters access to the salt licks and water situated on his farm (Tarus, 1994). Tarus (1994) highlighted that the progressive squatters, who possessed healthy livestock and abundant farm produce, were targeted by envious settlers who resorted to shooting their livestock and burning their farm produce. In the same vein, squatters were prohibited from selling their livestock, livestock products, or farm produce without the settler's knowledge (KNA DC/TAMB/12/1). This forced Elgeyo Marakwet to dispose of their produce at low prices (KNA/DC/TAMB/2/10/8). This was intended at curbing squatter's capacity to generate and accumulate wealth through agro pastoral economy.

The economic depression of 1930s also affected Elgeyo Marakwet squatters (Tarus, 1994). Settler farmers would not accommodate a herd of more than fifty cattle belonging to one resident squatter to ensure more pasture for their own livestock and crop cultivation (KNA DC/ELG/1/1). Squatters would be sent back to the reserves to obtain a permit (pass) from the District Commissioner at Tambach to re-enter the reserve with livestock (Tarus, 1994). Those seeking to move onto a European farm in search of a pasture for livestock as squatters also had to sort permission from the District Commissioner (Massan, 1968;

KNA/DC/ELG/1/1/1933-1937). Similarly, Tarus (1994) detailed that prospective squatters had to demonstrate and satisfy the District Commissioner at Tambach their compliance with several criteria: payment of current taxes, was married, ownership of registration of their cattle, and proof of good character and responsibility. Individuals within the community who did not meet these requirements were denied the opportunity to become squatters (KNA/DC/TAMB/1/7/1, 1930–1938).

Moreover, during Economic Depression period of 1929 to 1939, settlers intensified their harsh treated of squatters (KNA/DC/ELG/1/1/1933–1937). Squatter's experienced wage reductions, and settlers advocated for culling and reduction squatter stock, citing concerns over potential disease transmission to settler stock (KNA/DC/ELG/1/1). These measures were prompted by decline in prices of settler crops in the world market, which impacted settlers' commercial production for export and dismissed the demand for squatters (Chebet and Dietz, 2000; Kisaka, 2009). This downturn also adversely affected livestock production by limiting available pasture land. These controls, implemented by both the colonial state and settlers, aimed to suppress the chances of squatters becoming economically independent (Tarus, 1994). This constrained food production capabilities, particularly within the agro-pastoral economy.

Due to global economic depression, agricultural prices plummeted, prompting settler farmers to cuts costs (Tarus, 1994; Kisaka, 2009; Kanogo, 1987). As a result, settlers became reluctant to retain squatters, advocating for the return of resident Elgeyo Marakwet squatters and their livestock to Elgeyo and Marakwet reserves in the escarpment and Kerio valley ecological zones (KNA/DC/TAMB/1/7/1, 1930–1938). This resulted in many Elgeyo Marakwet people and their livestock relocating to the reserves, placing strain on their

capacity. The reserves, already depleted of available grazing areas, underwent significant ecological disruption due to overstocking, overgrazing, and overcultivation.

Key informant interviews also disclosed that a significant number of squatters sold their livestock at low prices to the settlers (Ruto, O.I., 2022). Furthermore, it is noteworthy to point out that wages decreased during this period. Tarus (1994) submits that prior to global economic depression, wages ranged from Rs. 8/= to 12/= per month with posho, or about 15/= without posho, with additional 2/= for Marakwet on humanitarian grounds. Similarly, wages declined to an average of 6/= per ticket plus rations (KNA/DC/TAMB/27/2). This situation suggests that colonial administration disregarded land rights of the indigenous people pushing Elgeyo Marakwet into squatterdom. Colonial land tenure system and squatter system arrangement in the study area further compromised community land ownership rights, resulting in diminished land available for crop cultivation and livestock keeping. This also limited land for shifting cultivation, fallow farming, intercropping, rotational grazing, thus exacerbating ecological degradation and food insecurity.

Furthermore, structural timber played a crucial role in constructing colonial administration centers essential for managing their territories (Tarus, 1994). Much of the land allocated to Grogan Ltd consisted of forests rich in podo carpus and scented cedar, ideal for roofing and furniture production (Tarus, 1994). These forests were exploited for export purposes (Chebet and Dietz, 2000). This resulted in the exploitation and depletion of natural vegetation in Kapchemutwa forest, Kipkabus forest, Kaptagat forest, Sergoit, Kapsowar and Cherangany areas. This contrasted sharply with indigenous Elgeyo Marakwet, who had traditionally adapted their lifestyle to their surrounding environment. In this context, colonial exploitation of Elgeyo Marakwet resources was undertaken with little regard to ecological conservation.

This left indigenous traditional peoples without sustainable means of subsistence. In addition, Elgeyo Marakwet community exacerbated environment degradation by grazing in the unalienated part of the highland ecological zone, clearing bamboo forest to create additional grazing grounds. This further contributed to ecological disruption and transformation.

Forests and trees play a critical role in enhancing food security through indirect contributions, bolstering agricultural sustainability (Kariuki, 2014). Forests and trees help maintain land productivity by drawing nutritive elements from deep within the soil into the production system and mitigate erosion caused by wind and water. Additionally, forests provide essential resources such as food and medicinal plants, as well as social sustainability, by offering recreational settings for people and religious shrines (Ogot, 1979; Kizito, 1998).

Vegetation serves a crucial role in shielding fragile soils against the sun and impact of raindrops (Kiage, 1998). Its removal through deforestation and overgrazing leads to soil fertility loss and advancing desertification in arid and semi-arid lands (ASALs). Thus, settlers' destruction of forests and trees in the study area altered ecosystem, impacting food production and food security. Loss of Elgeyo Marakwet land, especially in the highland plateau ecological zone, which was suitable for both crop and livestock production, was attributed to the Grogan concession (Arap Msafiri, O.I., 2022). This undermined and disrupted the basis of communities' traditional ecology knowledge, affecting the pre-colonial Elgeyo Marakwet agro-pastoral economy and food security without introducing viable alternatives. Elgeyo Marakwet ended up being marginalized and rendered uneconomically viable for production of food crops such as millet and sorghum due to increased population pressure as a result of land alienation, leading to environmental degradation and reduction in food production.

Based on the discussion, this study submits that E.M.S. Grogan Ltd played a central role in land dispossession and ecological disasters experienced by the Elgeyo Marakwet community. Alienation of land diminished available land for agro-pastoral economy in Elgeyo Marakwet and precipitated ecological degradation through deforestation across the three ecological zones, exacerbated by overcultivation and overgrazing, causing food shortages. Consequently, land alienation forced large numbers of Elgeyo Marakwet people to move to European farms as squatters to offer their labour in order to secure pasture land as squatters for their livestock, albeit temporarily. This migration interfered with labour force that was needed for agro-pastoral production, aggravating ecological degradation and food shortages and food insecurity within the community.

3.4 Wage Labour and Tax Policies, 1914-1945

During the colonial era, a large amount of labour was needed by both colonial administration and settlers (Omwoyo 1990; Kariki, 2015; Mwikali & Tanui, 2021). In the early years of colonialism, colonial government required labour to construct infrastructure such as roads and administrative offices (Tarus, 1994; Kisaka, 2009; Kariki, 2015). On the other hand, settlers needed a large amount of labour for their agricultural enterprises (Ndege, 1987; Zeleza, 1989; Cokumu, 2002; Okuro, 2002). Moreover, the colonial government needed sufficient revenue and manpower to sustain its operations and run its activities since the protectorate was supposed to be financially independent from Britain (Kariki, 2015; Kisaka, 2009). To achieve these objectives, various taxation and labour policies were introduced.

The first policy that was introduced by the colonial state to compel Africans to work for colonial authorities within and outside their regions was forced labour (Okuro, 2002; Tarus,

2004; Omwoyo, 2004). This policy was implemented in line with 1908 Communal Labour Law, which was aimed at mobilizing labour for government projects such as road construction, waterways, bridges, and railways (Ndege, 1987; Van Zwanenberg, 1975; Jalan'go-Ndeda, 1991; Stichter, 1982; Ochieng, I989; Tarus, 2004; Kisaka, 2009; Kariki, 2015). The major employing agencies under this framework were colonial administration, Public Works Department, railways, and, of course, the settlers, who needed labour for their cash-crop production and herding (Chebet and Dietz, 2000). In the case Elgeyo Marakwet, policies regarding land, labour and taxation were instrumental in forcing them to engage in wage labour (Tarus, 2004; Chebet and Dietz, 2000). However, it should be noted that these policies on land, labour and taxes were not only meant for the people of Elgeyo Marakwet but for the whole protectorate. Therefore, it is pertinent to examine the implication of wage labour in Elgeyo Marakwet, its attendant effects on ecological management and conservation, agro-pastoral economy, and food security.

By 1914, nearly all land in Uasin Gishu plateau had been given to the British and Afrikaner settlers (KNA, DC/UG/1913–1914). Similarly, land, labour and taxation were pivotal factors that necessitated the people of Elgeyo Marakwet to come into contact with the European settlers (Tarus, 2004; Chebet and Dietz, 2000). These factors-land, labour and taxation, pressured settlers in Uasin Gishu, adjacent to Elgeyo Marakwet, to encroach and exploit land and human resources through land alienation and utilization of cheap labour, dislodging them from their means of food production, which was agro-pastoral economy. Chebet and Dietz (2020) noted that both settlers in Uasin Gishu and British colonial officers viewed "Elgeyo Reserve" and "Marakwet Reserve" as a natural labour supply area, without any other development prospects planned for the local people. Massan (1968) argues that;

> Elgeyo are, like most natives, quick to learn mechanical work. They are...experts at handling cattle and have become good drivers for farms and transport. Properly handled, they are good laborers, as European farmers on the plateau have proved. The sub-contractors who built the Uasin Gishu railway found them very satisfactory except for the heaviest work-breaking metal for ballast, for instance, at which work they were physically incapable of competing with the hefty Kavirondo. An employer able to handle natives finds Elgeyo easy to manage. It is granted that they are obdurate and difficult if they feel they have a grievance, and certainly they will not work in districts that are far from their homes (cited from Tarus, 1994).

In 1910, the first group of settlers from South Africa employed few Africans compared to settlers in 1920s post-First World War (Tarus, 1994). A small contingent of Africans was engaged to assist settlers in tasks such as clearing land, building houses, and performing domestic duties. Uasin Gishu annual report 1913–1914 records that many of the Elgeyo Marakwet people were recruited as laborers to clear extensive European-owned farms newly acquired in Uasin Gishu (KNA, DC/UG/1913–1914). This was attributed to limited capital available for hiring a large labour force (Clayton and Savage, 1974; Zwanenberg, 1972). These settlers sought assistance from the colonial government to secure cheap labour that would not jeopardize settler profitability. It is also important to point out that the colonial state was committed to ensure the success of European settler farming (Cokumu, 2002; Ochieng, 1989; Stichter, 1982; Omwoyo, 2004). Tarus (1994) noted that the result of these was land alienation, Kipande system, and the imposition of taxation on the Elgeyo Marakwet people.

The colonial authorities introduced Kipande system to limit movements of African workers (Wasike, 2018; Zwanenberg, 1972). This was done by the colonial government to achieve settler success (Ochieng, I989). Similarly, during the First World War from 1914 to 1919 (*boriet ab Jeruman nebo tai*), most Keiyo and Marakwet were recruited to participate in the war (Sawe, O.I., 2022). Keiyo and Marakwet men were recruited as porters (Tarus,1994). The impact of this war on Elgeyo Marakwet agro-pastoral economy was enormous. The abrupt withdrawal of almost all able-bodied males meant that agro-pastoral labour in Elgeyo Marakwet fell to women, elderly men, and children. This had a detrimental effect on transfer of ecological knowledge, indigenous ecological and agro-pastoral production systems, leading to food shortages (Ruto, O.I., 2022).

In the same vein, famine of 1918–1919, known locally as *kenyitab kibichobitit* (year of locust), forced the people of Elgeyo Marakwet into wage labour (KNA, DC/UG/1918–1921). According to Van Zwanenberg (1975), Governor General, Sir Edward Northey, in 1919 issued a circular aimed at mobilizing the whole administration machinery towards supplying enough cheap labour for the settlers. This directive was implemented through colonial chiefs and headmen (Okuro, 2002; Tarus, 2004). Following the 1919 war, soldiers' settlement scheme led to massive land alienation and an increase in settlement on Uasin Gishu plateau, including highland ecological zone of Keiyo and Marakwet (Hill, 1976). This development facilitated introduction of flax and wattle cultivation in Elgeyo Marakwet. Flax was grown within the Kaptagat, Chepkorio and Kipkabus regions of Elgeyo Marakwet, while wattle was grown near Eldoret town and in the estates of Eureka and Kapsiliot (Tarus, 1994). The cultivation of flax is evidenced by a place named flax in Chepkorio ward, Keiyo South Constituency, Elgeyo Marakwet County.

Large-scale cultivation of flax in the early 1920s was prompted by high prices resulting from the disruption of flax exports from Russia and Belgium during wartime (Wolf, 1974; Duder, 1978). Consequently, for its success, labour was needed. This, therefore, led to policies such as wage labour, taxation and introduction and use of *Kipande* (an identity document that featured basic personal details and employment history), and recruitment by local chiefs were instituted (KNA/DC/UG/2/1, 1909–1933). In 1920, approximately, fifty Keiyo men worked in Eldoret town and forty harvested flaxes for the Settlers in Uasin Gishu (Tarus, 1994). Severe food shortages experienced in 1917 and 1920 attests to this large-scale recruitment of the people in wage labour during this period (KNA/DC/UG/2/1, 1909–1933).

The Elgeyo Marakwet people were also engaged as railway construction laborers (Chebet and Dietz, 2000). Stichter (1982), in his analysis of labour migration in Kenya, characterized some of it as compulsory labour, particularly in the construction of Uasin Gishu railway during early and mid-1920s. Stichter further noted that many Keiyo and Marakwet men who participated in the construction of Uasin Gishu railway lost their lives due to various challenges including influenza outbreaks, strenuous labour, poor living conditions, and insufficient diet. This is supported by Uasin Gishu annual report of 1909–1933, which indicates that a severe famine and influenza epidemic reduced Keiyo population from 16,993 in early 1918 to 15,833 in early 1920 (KNA/DC/UG/2/1, 1909–1933).

Consequently, labour participation increased for Keiyo to “559 on registered contracts of one to three months and another 200 on verbal contracts (KNA/ELGM/1/1). This was close to 30 percent of all adult Keiyo men (Tarus, 1994). During this period, government officers organized famine relief works or food-for-work programs (Stichter, 1982; Chebet and Dietz, 2000). Thus, it is evident that these circumstances deprived the community of labour

necessary for food production through crop cultivation and livestock keeping, contributing to a reduction in food production and increased food insecurity**.** Additionally, the traditional forms of labour organization for rotational grazing, ecological management and agro-pastoral production systems such as crop rotation, irrigation water management and shifting cultivation, were greatly disrupted.

Furthermore, colonial administrators employed some Keiyo and Marakwet as mail runners, messengers, and summons servers (Chebet and Dietz, 2000). The District Commissioner also required a cadre of chiefs, headmen, interpreters, and hut counters (Tarus, 1994). Chiefs and headmen were appointed from clan elders (Sawe, O.I., 022). Their duties included maintenance of law and order and tax collection (KNA DC/ELGM/3/1/2). The interpreters and hut counters were selected from among Swahili and Somali who had settled at Eldama Ravine (Cherwon, O.I., 2022). Chiefs received approximately Rs. 20/= per month, while hut counters and interpreters received a wage of Rs. 30/= per month (KNA, DC/ELGM/3/1/2).

In the period between July and September 1920, Elgeyo Marakwet experienced a severe famine (Chebet and Dietz, 2000). This compelled more Keiyo and Marakwet men to seek short-term contracts of one to three months. Elgeyo Marakwet annual report of 1923 indicates that government officers exploited hunger situation to persuade as many able-bodied men in Elgeyo Marakwet to become labour migrants (KNA/DC/TAMB/1/2/1). Settlers were paying part of the wage in the form of food rations. As a result, work of livestock keeping, rotational grazing, shifting cultivation, weeding, and harvesting crops in the Kerio Valley ecological zone fell entirely on women and children, contributing to reduction ecological management practices, food production and food security.

The Elgeyo and Marakwet people who were prisoners (*mobus*), particularly those caught stealing livestock or failed to pay taxes, were employed in Public Works Department (Komen, O.I., 2022). They were used in construction of roads linking Eldoret and settlement areas, Uasin Gishu railway from Nakuru to Eldoret through Timboroa between 1921 and 1924, and the "valley road" from the southern part of Kerio Valley to the border with Marakwet in the north (Tarus, 1994; Chebet and Dietz, 2000). The large number of males working outside Elgeyo Marakwet with poor payment left women as the sole workers on the fields, along with their normal family duties. This likely contributed to the frequent food shortages such as *kemeutab Kimakatoi* (famines of skins, where people ate animal skins) and *kemeutab Kipsigirio* (famines of donkeys, where people ate donkey meat) that plagued the people of Elgeyo Marakwet during the colonial period (KNA/DC/TAMB/1/2/1). This illustrates that the pre-colonial system of labour organization among the people of Elgeyo Marakwet was significantly disrupted throughout the colonial period due to the demands for wage labour.

By mid-1920s, livestock keepers, opted to move to white settler farms as squatters, with 250 Keiyo families registered as squatters on the white settler farms (Massan, 1968). These squatters were required to work for an agreed number of days on the settler's farms to be able to maintain their squatter status (Chebet and Dietz, 2000). This system of closely supervised labour recruitment undermined agro pastoral economy, contributing to food shortages. According to Massan (1968), district officers in Uasin Gishu counted more than 1200 Keiyo as laborers on white farms and on the Uasin Gishu railway project, further reducing labour for Elgeyo Marakwet agro-pastoral economy. The agricultural census for native areas in 1930 indicated that food production in the Keiyo and Marakwet areas was close to 6000 tons, with

approximately 50,000 people. This was less than 140 kg per capita, thus quite insufficient to contribute to food security (KNA/DC/TAMB/1/2/1).

During the economic depression of 1930s, labour demand among settler farmers in Elgeyo Marakwet decreased, monthly wages dropped to six shillings, and food rations dropped (Massan, 1968). After colonial economy recovered, labour migration from Elgeyo Marakwet increased significantly, with many individuals seeking work outside the district (Chebet and Dietz, 2000; Tarus, 1994). Elgeyo Marakwet annual report of 1938–1939 indicates that more than 3000 Elgeyo Marakwet worked outside their district constituting approximately a quarter of all adult men in Elgeyo Marakwet (Chebet and Dietz, 2000). It can, therefore, be surmised that wage labour demands disrupted Elgeyo Marakwet agro-pastoral economy, by reducing working hours of people on their farms and livestock activities. This negatively impacted crop production and livestock production.

Imposition of taxes was another method used by the colonial administrators to disengage the people of Elgeyo Marakwet from their land, ecology, and agro-pastoral economy. Tax payment was in monetary terms (Tarus, 2004). These colonial taxes were introduced to cover the costs of colonial administration and to make the colony self-sufficient (Okuro, 2002; Ndege, 1992; Tarus, 2004; Kisaka, 2009; Omwoyo, 2004; Zeleza, 1982). However, the economic prosperity of the colonial state was heavily reliant on European settler production, which demanded significant labour inputs (Kisaka, 2009; van Zwanenberg, 1972). European settlers needed large numbers of Africans to work on their settler farms for the agricultural economy to thrive (Omwoyo, 1992; Kisaka, 2009; Kanogo, 1987).

However, Africans were not readily willing to participate in wage labour (Kanogo, 1987; Kisaka, 2009). Taxation emerged as the primary strategy to coerce Africans into wage labour (Tarus, 2004; Ndege, 1992). The rationale behind imposing heavy taxes was that if a man had to obtain money to pay these taxes, they would be forced to work as wage laborers to raise the necessary money (Wasike, 2018). Thus, colonial government utilized taxation to generate adequate labour supply within the colony. This policy led to introduction of taxation as a key mechanism to compel Africans into wage labour and raise revenue for the colonial administration (Kisaka, 2009; Mwikali & Tanui, 2021).

In Kenya, tax collection began in 1901 when the Colonial Secretary, Lansdowne, authorized a tax of up to two rupees on every African dwelling (Tarus, 2004; Cokumu, 2002; Okuro, 2002). Taxation was used as a method of getting Africans into wage-labour (Brett, 1973; Spencer, 1983; Ndege, 1987; Okoth-Ogendo, 1990). The Elgeyo Marakwet, like the rest of the colony's population, were subjected to these taxes (Tarus, 2004).

At the beginning of British administration in Elgeyo Marakwet, colonial officers in Eldama Ravine accepted tax in the form of grains, goats, cattle, sheep, and honey (Sigira, O.I., 2022). Harlow and Chilver (1965) and Chebet and Dietz (2000) noted that tax officials lacked a consistent framework often resulting in officials acquiring large quantities of livestock from Elgeyo Marakwet as tax payment in Eldama Ravine, where they were used as food. This practice imposed a very heavy economic burden on the people of Elgeyo Marakwet.

Key informant interviews revealed that instead of the people of Elgeyo Marakwet raising their herds of livestock and storing huge millet and sorghum surpluses, most of them were giving out their agro-pastoral produce to raise taxes (Sawe, O.I., 2022). This made livestock

keeping and storage of grains for future use less effective and was one of the major setbacks to the prevention of food shortages. This system (payment of tax by use of grains, goats, cattle, sheep, and honey) was replaced with labour taxation for settler farms and public works for low wages and later payment in monetary terms (Tarus, 2004). This shift was attributed to the reduced number of livestock among Elgeyo Marakwet (Busienei, O.I., 2022).

In 1910, Hut tax was introduced in Elgeyo Marakwet (Tarus, 1994). This tax was levied per hut and paid by every married man who served as the head of household (Kisaka, 2009). Its primary objective was to disengage the people from their agro pastoral activities and seek wage labour in the settler farms. Introduction of Hut tax in the study area was overseen by the acting District Commissioner of Eldama Ravine in Baringo District, who was nicknamed *Kibarenge* (Tarus, 1994; Chebet and Dietz, 2000). The nickname *Kibarenge* was attributed to the Commissioner's cheerful disposition (Ruto, O.I., 2022).

Among the Elgeyo Marakwet, Hut tax represented a deeply resented facet of colonial governance. This is because Elgeyo Marakwet people were socially polygamous in nature, and tax payment was in the form of money (*rupee*). This forced them to sell their livestock in large numbers to raise the required revenue. Those who had depleted their livestock reserves were compelled to provide labour on the white settler farms in Uasin Gishu plateau. This imposition severely disrupted their traditional agro-pastoral economy and food production systems. The collection of this tax was marred by harsh measures such as physical punishment and confiscation of property by tax collectors (Tarus, 1994). According to key informant interviews, colonial administrative officials, often accompanied by askaris and tax collectors, made frequent visits to Keiyo-Marakwet to oversee tax collections (Tuitoek, O.I., 2022). This practice aligns with Tarus's (2004) observation, which notes that Tribal Police,

chiefs, and headmen, also accompanied by their clerks and askaris, travelled to sub-locations for tax collection. Those who failed to meet tax obligations faced confiscation of their livestock for sale.

An FGD session with clan elders conducted at Tambach shopping centre in the year 2022 revealed that collection of taxes occasionally took place at night when the majority of tax-payers were at home as they often hid in the escarpment ledge during the day. In addition, those who were unable to escape to the escarpment ledge were forced to sell their livestock to meet their tax obligations (Tarus, 1994; Tarus, 2004). This harsh tax collection method forced people to flee their homes and seek refuge at the escarpment ledge (Chepkon'ga, O.I., 2022). The Keiyo built their hamlets along the escarpment ledge, where they were not easily traceable (Tarus, 1994). This contributed to the encroachment and disturbance of the escarpment ecology which was source of streams and rivers for agropastoral production. The extent of taxation in Elgeyo Marakwet is indicated by the statistics for both Keiyo and Marakwet tax payments between 1912 and 1919, as recorded below:

Table 3.1: Elgeyo Marakwet Tax Figures for the Period 1912-1919

Year	Amount in Rupees
1912-1913	3117
1913-1914	6741
1914-1915	12837
1915-1916	16197
1916-1917	17478
1917-1918	17546
1918-1919	17157

Source: KNA/ELGM/1/1, Elgeyo Marakwet Annual Reports 1912-1919

As depicted in Table 3.1, there was a significant increase in tax collection until 1918, with no recorded tax figures for 1919–1920. From 1919, chiefs were tasked with tax collection duties, including apprehension of tax defaulters (KNA/ELGM/1/1). They region experienced famines in 1919, which led to substantial loss of livestock. Indeed, this is confirmed by the political record file of 1919 (KNA/DC/UG/2/1), which states that there was a famine in 1918–19. The people of Elgeyo Marakwet recall the period when there was a severe drought and famine called *kiplelkowo*, marked by remains of bones lying around due to dead livestock (Ruto, O.I., 2022; Tuitoek, O.I., 2022; Chemuok, O.I., 2022). Furthermore, the tax rate was increased to five rupees in 1919 despite the famine. It is also important to point out that the District Commissioner continued to pressure collection of hut tax (KNA/DC/UG/2/1). Additionally, colonial government, prohibited Keiyo from grazing in areas and farms adjacent to their reserve (KNA/DC/UG/2/1). These actions drastically altered Elgeyo Marakwet's traditional ecological management practices, agro-pastoral production systems and their accustomed adaptation strategies prior to colonial rule.

Initially, colonial taxes were paid in rupees (Rs); however, as from 1922, tax payments were transitioned to shillings (Kshs.) (Tarus, 2004; Kisaka, 2009). The 1922 Annual Report (KNA/DC/ELGM/1/1) shows an escalation in Hut tax rates from Sh.3 to Sh.5 in 1922 to Sh.10 and Sh.12 in 1923. Despite the tax increase to Sh.12, wage of Elgeyo Marakwet remained at Sh.6 or Sh.7 (KNA/DC/ELGM/1/1). This forced Elgeyo Marakwet to sell their livestock to meet their tax obligations. In 1921, Elgeyo Marakwet were estimated to have 41,628 head of cattle and 70,000 sheep and goats (KNA DC/ELGM/1/1). One cow fetched between Sh.15 and Sh.20, while a goat or a sheep went for between Sh.4 and Sh.7.61 (Tarus, 1994; Chebet and Dietz, 2000). To avoid paying too much tax and losing their livestock, people demolished their houses to reduce the number of taxable huts. For instance, in Elgeyo

between 1931 and 1932, huts were reduced from 5863 to 5572, while in Marakwet, they were reduced from 5911 to 5883 (KNA/ELGM/1/1).

The droughts that occurred during 1927–1929 and 1933–1934 had a severe impact on African livestock, particularly in the pastoral areas of the Rift Valley, including in Elgeyo Marakwet, and in the northeastern Kenya (Kisaka, 2009). But despite these natural disasters, to the surprise of the African herders, the colonial administration persisted with state's policy of destocking. Moreover, these periods of drought coincided with the Great Economic Depression, which in various ways prompted the colonial state to intensify destocking efforts in areas inhabited by Africans (Chebet and Dietz, 2000).

In mid-1930s, Elgeyo Marakwet faced food shortage (KNA/DC/ELGM/1/3). To address this, the Local Native Council (LNC) provided food for famine relief in exchange for labour on communal shambas at Mutei, Tumeiywo, Mukerro, Kapchemutwa, Sambirir, and Endo (KNA/DC/ELGM/1/3). However, this relief food effort did not lead to a tax exemption (Tarus, 1994). In the same year, tax rates were increased (KNA/PC/RVP/4/2/2) for the purposes of increasing labour availability. Most of tax payments were obtained through wage-labour and sale of livestock (Chebet and Dietz, 2000). The Elgeyo and Marakwet reserves were stripped off all its able-bodied persons resulted in neglect of ecological management and conservation practices, and agro-pastoral production systems, exacerbating food shortage and leading to instances of starvation.

In 1935, settlers in Elgeyo Marakwet established Sergoit and Moiben Valley Farmers Association with the aim of addressing labour shortages on European farms (KNA PC/RVP/6A/1/15/4). This initiative was aimed to replace squatter system with wage labour

among the Elgeyo (Tarus, 1994). In the same vein, the association advocated for the introduction of *Kipande* to force the people of Elgeyo Marakwet to provide wage labour (KNA PC/HVP/6A/1/15/4). Tarus (1994) argued that colonial officials based at Tambach held barazas (public meetings) from 1937 onwards, and emphasized the importance of young men going to work. This was done to coerce the people of Elgeyo Marakwet into wage labour. However, this initiative was resisted by the community due to concerns over low wages (Tarus, 1994).

Persistent shortage and unreliable supply of labour remained a significant concern for colonial officials. By early 1940s, Kerio Valley area, where human population was more sparsely settled, exhibited visible signs of land pressure and ecological degradation. This was largely due to colonial land alienation, creation of reserves, and imposition of taxation, which compelled the majority of Elgeyo Marakwet people to move, settle and economically exploit Kerio Valley ecological zone through crop cultivation and livestock keeping. This resulted to ecological degradation (KNA/DC/ELGM/1/2/1; 1937–46). Furthermore, in 1944/1945, Elgeyo Marakwet region experienced one of the worst famines caused by prolonged drought. Key informant interviews note that colonial government did not provide any intervention, and made it impossible for them to pay taxes. This is supported by Elgeyo Marakwet district annual report of 1937–46, which indicates that there was no famine relief food supply from the government (KNA, DC/TAMB/1/2/1; 1937–46).

As a result of the prolonged drought and famine in the year 1944/45, the people of Elgeyo Marakwet were unable to pay taxes promptly to the colonial government due to massive loss of their livestock. This situation forced them to become dependent on colonial government, providing labour for small wages to be able to pay taxes and obtain food. Therefore, colonial

government, through its labour and tax policies, forced the people of Elgeyo Marakwet to offer labour and dispose off their livestock to fulfil tax requirement. This dependency undermined the community's ecological conservation practices, agro-pastoral production systems and food security. Moreover, many hid in the escarpment caves to evade paying taxes, further disrupting their ecology, agro-pastoral production, and overall food security.

3.5 The Second World War and Food Shortage in Elgeyo Marakwet, 1939-1945

The Second World War, was a global war that lasted from 1939 to 1945 (Nyanchoga, 2023). This war impacted the African continent directly through some battles fought on the African soil or indirectly through the mobilization of human and material resources to support the war effort (Owino, 2018; Nyanchoga, 2023). With the outbreak of World War II in 1939, colonial administration made a general appeal to Africans to make contributions to the war effort (Tarus, 1994; Kisaka, 2009). African contribution to the war effort entailed provision of additional troops and material resources (Tarus 1994; Kisaka, 2009; Chebet and Dietz, 2000). Robert Brooke, the governor of Kenya (1936–1939), emphasized this:

> Help Great Britain by every means in our power, especially by ensuring that we are ready to face any eventuality, that we continue to be self-sufficient in all essential foodstuffs, and in so far as we are able to produce what Great Britain wants most (Zeleza, 1989).

Thus, outbreak of the Second World War increased demand for labour in farms and livestock products, especially meat, to sustain war troops in Europe (Zeleza, 1989). Elgeyo Marakwet community contributed to war by providing both manpower as soldiers and livestock meat to

feed soldiers in Europe (Tarus, 1994). Chebet and Dietz (2000) observed that many of the people of Elgeyo of *Maina* age set generation were recruited into the Kenya-Africa Rifles. Keiyo recruits were highly regarded for their skills as mechanics in army workshops in Kenya and in battlefields in Burma and Malaya (Chebet and Dietz, 2000).

The Elgeyo Marakwet annual report of 1945 stated that the district had the second highest percentage of all Kenya tribes in civil employment after the Kikuyu (KNA, DC/ELGM/1940–1945). Thus, participation of large numbers of able-bodied Elgeyo Marakwet men deprived the community of essential labour that was needed for the agro pastoral production. This adversely affected pre-colonial livestock keeping and cultivation of millet and sorghum, both which were crucial adaptive strategy for food production and food security based on community's ecological knowledge.

During the Second World War, colony of Kenya was compelled to rely on its own resources to produce food, not only to feed local population but also to sustain large garrisons of troops and Italian prisoners of war captured from the Horn of Africa (Kisaka, 2009). This effort aimed to maintain internal self-sufficiency while generating a surplus to support the war (Zeleza, 1989). This need stimulated settler agricultural production, which was their principal contribution to the war effort. To achieve this, colonial government established cooperatives, which were meant to spur settler agriculture (Zeleza, 1989). This initiative included colonial government championing local people to increase production of basic grains, particularly maize (Omwoyo, 1992).

The colonial state continued to collect taxes even during the Second World War (Chemuok, O. I., 2022). The people of Elgeyo Marakwet were expected to contribute to the war effort by

giving out foodstuffs such as meat, maize flour, and beans to feed the war troops as well as paying taxes (Tarus, 1994; Chebet and Dietz, 2000). Key informant interviews revealed that Elgeyo Marakwet people resisted giving out foodstuffs, particularly meat, to the Europeans (Sigira, O.I., 2022; Ruto, O.I., 2022). As a result, colonial administration implemented a policy of compulsory individual contributions rather than voluntary contributions to the war effort (KNA, DC/ELGM/1940–1945).

The Policy of compulsory individual contribution required chiefs to ensure their communities met and supplied the targeted quota of foodstuffs, including bulls (Tarus, 1994). This mandate compelled each household to give in to the exploitative demands of the colonial administration (Chebet and Dietz, 2000). Key informant interviews revealed that their livestock, particularly bulls, were forcefully confiscated, which reduced the number of their livestock and affected their reliable source of food, meat and blood (Arap Kaluk, O.I., 2022).

Young, energetic men were uprooted from rural areas for labour, leaving women, children, and the elderly to perform all the agro-pastoral work (Tarus, 1994). Elgeyo Marakwet labour force was overstretched as the colonial administration expected them to increase animal and crop production in order to meet war demands (Chesang, 1973). As a result, agricultural lands suffered immensely from over-cultivation, soil erosion and exhaustion, significantly transforming ecology, food production, and food security.

By 1945, it was becoming clear that the only way to achieve sustainable agricultural development within the native reserves was through effective coordination of land and water conservation (Kisaka, 2009). This was achieved through provision of funds by the Colonial Development and Welfare Funds (Zeleza, 1989). This task was achieved largely by African

Land Development (ALDEV), which was established in 1945 (Chebet and Dietz, 2000). ALDEV was established to address African settlement and rehabilitation programs as the only solution to problems arising from population growth in African-occupied areas of Kenya, including in Elgeyo Marakwet. These initiatives aimed to mitigate the degradation of ecology, forests, soil, and water resources in the district, which were adversely affected food supplies (KNA, DC/TAMB/1/9/8, 1944–45). The first area designated for this purpose was Chepkorio in Keiyo highland ecological zone, an area that was suitable for agro-pastoralism and had been inhabited by the Keiyo before colonial land alienation for European settlements (Massan, 1968).

The African Land Development Programme also promoted soil conservation measures in Elgeyo Marakwet by constructing dam units in Irong and Kondabilet (Kipkemei, 2020). The purpose of the dam at Irong was aimed to offset the serious erosion caused by cattle trails leading to Sergoit Lake (KNA, DC/TAMB/1/9/8, 1944–45). Additional conservation measures included planting Kikuyu grass on contour banks to control soil erosion in Metkei, Tumeiywo, Chepkorio, Chebiemit, and Kipsaos areas (KNA, DC/TAMB/1/9/8, 1944–45). Eroded areas in Simotwo Valley were fenced off to prevent further damage from livestock (KNA, DC/TAMB/1/9/8, 1944–45). Contour farming practices was also introduced in various parts of Elgeyo Marakwet.

In mid-1940s, when land degradation threatened peasant production in Kenya, colonial government reintroduced communal work groups so as to promote soil conservation efforts (Matheka, 1992). This conservation, however, was not confined to Kenya and Elgeyo Marakwet in particular. It was also a common practice in colonial Africa. For instance, during the Second World War, the protectorate government established 'war lands' in Botswana

where communal labour was applied in the food production to support the war effort abroad (Bhila, 1984).

Towards the end of World War II, Elgeyo Marakwet were ordered to stop cultivation and grazing of livestock on the escarpments and near water catchment areas. This directive interfered with the cultivation of millet and sorghum and grazing of livestock in the escarpment ecological zone during the dry spell. It also constrained the grazing of livestock between the escarpment and Kerio Valley ecological zones, which had been crucial for the pre-colonial food production and food security strategies (Chemuok, O.I., 2022). This caused overgrazing in Kerio valley ecological zone, thus ecological degradation.

In addition, colonial administration organized “barazas” between local people and colonial officials (Chebet and Dietz, 2000). These meetings were held on demonstration plots dedicated to soil conservation and better farming methods. Critchley (1983) noted that during the colonial period, agricultural activities in highland ecological zone of Elgeyo Marakwet District were under the control of District Agricultural Officer (DAO). DAO emphasized adoption of better farming techniques, soil conservation measures, and use utilization of farmyard manure to enhance agricultural productivity.

Interviewed farmers revealed that they were mandated to construct animal sheds (*Kaptich*) where their livestock, particularly cattle, could be confined for some time, with collection of cow dung every morning, and heaped outside these sheds to decompose into cow manure (Kibowen, O.I., 2022). This composted cow manure was used in agricultural fields to improve soil fertility. Wangari (2010) opined that composted cow manure provides several soil benefits, including improved soil aeration and increased moisture retention capacity,

which reduces the need for frequent watering of agricultural farms and aids in soil structure improvement. In the pre-colonial Elgeyo Marakwet, demonstration plots were established to illustrate effective use of cow manure. According to the then District Commissioner of Keiyo-Marakwet, J. A. Massan:

> ….to promote the growth of high-paying cash crops among the Elgeyo, Africans were to be taught how to use farmyard manure, and this was only to be achieved through the use of demonstration plots (Massan, 1968).

Key informant interviews indicated that colonial officers in Elgeyo Marakwet set up demonstration centres or plots to showcase application of cow manure and soil conservation techniques at the chief's office (Busienei, O.I., 2022). These demonstration sites were strategically located at the chief's office to ensure that all people who visited the chief would be taken to see the efforts aimed at cultivating food crops using cow manure (Cherwon, O.I., 2022). It is only after sufficient production of food crops had been achieved and soil fertility restored that these practices were extended to suitable cash crop areas in the highlands (Kisaka, 2009).

The government funded soil conservation measures in the district through the Department of Agriculture (KNA/DC/ELGM 2/6). The state appointed locals as scouts and were under the supervision of a white administrator to ensure that the community adopted effective soil conservation methods within their locale and planted jacaranda trees in Kerio valley ecological zone (Sigira, O. I., 2022). These efforts underscored colonial state's objective to bolster agricultural production to sustain colonial administration costs and support the war effort. It is evident that these agricultural interventions in colonial Elgeyo Marakwet primarily aimed to supply provisions for war troops rather than addressing local ecological

challenges and food security needs. These agricultural programs did not provide immediate remedies to environmental degradation and food shortages in the area.

3.6 The Changes in Crop Production among the Elgeyo Marakwet, 1920-1963

In the pre-colonial period, inhabitants of Elgeyo Marakwet predominantly cultivated millet and sorghum (Cherop, 2020). These crops played a vital role in food production and food security within a well-managed ecology. However, to Europeans, millet and sorghum were unprofitable and unsuitable for commercial purposes (Omwoyo, 2004). Thus, these traditional crops were disregarded and replaced with new crops (Tarus, 1994; Omwoyo, 2004). The ultimate goal of colonial governments was to exploit local resources for their own gain (Kisaka, 2009). This was accomplished through extraction of natural resources and promotion of cash crop production. As a result, indigenous population in most of the colonized areas of Kenya were coerced into cultivation of these new commercial crops (Karigi, 2015).

It is important to note that colonial economic policies were largely shaped by the necessity to sustain the viability of white settler agriculture (Kisaka, 2009). Okoth-Ogendo (1991) has traced the origins of Kenya's agrarian law and institutions through colonial and post-colonial periods and argued that settler farming was promoted at the expense of indigenous agriculture. This agrarian law and institutions were restructured to facilitate economic transformation. Thus, in order to develop a self-sufficient economy, colonial government promoted the cultivation of both food and cash crops (Groen, 1908; Tarus, 1994).

In Elgeyo Marakwet, colonial administration introduced new crops between 1919 and 1954 (KNA/DC/ELGM/1/1). These new crops included wheat, maize, linseed, and English

potatoes (KNA/DC/ELGM/1/1). In 1910 and 1911, the Governor of Kenya, Sir Percy Girovard, directed provincial and district leaders to prioritize agricultural crop production as a strategy towards opening up the reserves (Massan, 1968). The people of Elgeyo Marakwet, like many other communities in Kenya, were reluctant to adopt the new crop varieties, especially maize. They were accustomed to their traditional food crops, particularly millet and sorghum, which had become integral to their diet and suited their ecological conditions.

In 1922, J.A. Massam, the District Commissioner for Keiyo-Marakwet District, attempted to stimulate agricultural production among the people of Elgeyo Marakwet (Tarus, 1994). However, he noted that people of this district were reluctant in adopting new agricultural methods or cultivating new crops. To overcome this, District Commissioner resorted to offering bribes to influential elders and headmen (Massan. 1968; Tarus, 1994). These included gifts such as bananas, cassava, and sweet potatoes. This was intended to coerce them into adopting and demonstrating proper cultivation techniques for the new crops (KNA DC/ELGM/1/1/1920–1927). This is evidenced by the assertion of J.A. Massan on how he introduced new crops in Keiyo-Marakwet District, which he documents:

> …In order to gain their interest in increased food supplies, I was practically obliged to bribe them by giving the headmen and the more influential elder's presents of bananas, cassava roots, sweet potatoes, and other foodstuffs. These gifts acted as sugar to appeal, and while the elders ate, I took the opportunity to demonstrate the correct cultivation of the various plants. They always listened very attentively, but not always receptively, and I occasionally caught out some old man whose thoughts had been elsewhere by asking him to repeat what I had said.... In short, they give a newcomer the impression that they are a thoroughly lazy and useless tribe.

> In reality, they have many good qualities and are likeable people. Most of them are intelligent… (Tarus, 1994).

In addition, colonial administration undertook several steps in introducing new crops in Elgeyo Marakwet (KNA DC/ELGM/1/1/1920–1927). The first step involved training agricultural instructors and extension workers (Chebet and Dietz, 2000). This was meant to educate the local communities on how to cultivate these new crops to promote agricultural development in marginal areas (Kisaka, 2009). For this purpose, demonstration plots known as “headmen plots” and seed plots were established to cultivate seeds for distribution to local farmers (KNA/DC/ELGM/1/1920-1927). The practice of randomly broadcasting seeds was replaced with row planting, a phenomenon adapted from settler plantations. Maize had to be planted with a maximum of two seeds per hole, and any excess seedlings were uprooted (Ruto, O.I., 2022).

However, key informant interviews noted that the Elgeyo Marakwet community struggled to adopt and cultivate the new crops because much of their land in highland ecological zones that they looked to for their survival and security, had been alienated by the white settlers. Land that remained had to be reserved for very essential crops, especially millet and sorghum, and for grazing purposes (Tallam, O.I., 2022; Chebii, O.I., 2022). Additionally, Tarus (1994) observed that the new crops did not fit into people's diets. Furthermore, these new crops were foreign to the community and did not align with the Elgeyo Marakwet agricultural calendar or cycle, which was based on their pre-colonial ecological knowledge (Kipchoge, O.I., 2022).

The people of Elgeyo Marakwet in the highland ecological zone reserve, who owned tracts of land that were only suitable for cattle grazing and not cultivation, attempted to make the best

of an unfavorable situation. They continued to grow their traditional crops, particularly local maize, millet, and sorghum, on Elgeyo escarpment ledges and watered areas of the Kerio Valley (Tarus, 1994). It can be argued that colonial government's attempt to introduce new crops among the Elgeyo Marakwet was unsuccessful and had no impact on agricultural production. The natives continued to suffer ecological disasters, food shortages and food insecurity due to overcultivation and overgrazing in the escarpment and Kerio Valley ecological zone. This led to ecological transformations in the area.

By mid-1920s, the new crops introduced in highland ecological zone, particularly maize and wheat, had been cultivated on settler farms (Chebet and Dietz, 2000). This ecological zone was well-suited for crop production due to its fertile soil and good climate (Chebet and Dietz, 2000). Tarus (1994) opines that, apart from its ecological suitability, railway was sited through European areas along Ainabkoi, Kipkabus, Kaptagat, Plateau, and Eldoret. Colonial administration availed settlers a good number of efficient extension workers (Chebet and Dietz, 2000). Under their guidance, farming equipment was distributed, and settlers received high-quality seeds and livestock (Kisaka, 2009). Settlers, thus, operated in a protected environment (KNA/DC/ELGM/1/3). Key informant interviews indicated that introduction of new crops in the escarpment and Kerio Valley ecological zones was intended to discourage pastoralism and promote crop farming among the local community (Kalkal, O.I., 2022).

During the economic crisis of 1930s, which severely hit the white settlers, labour demand decreased, and monthly wages dropped (Omwoyo,1990; Kisaka 2009). This led to a relaxed government attitude towards the people of Elgeyo Marakwet (Chebet and Dietz, 2000). As a consequence, many Elgeyo people moved to Cherangany Hills (Northwest), an area inhabited by the Sengwer, a small ethnic group engaged in hunting and gathering as well as livestock

keeping (Tarus, 1994; Chebet and Dietz, 2000). The Marakwet also used this area to herd their cattle during dry seasons (Cherop, 2019).

Migration of the Elgeyo to Cherangany Hills by late 1930s caused environmental degradation as a result of increased pastoral activities (Massan, 1968). In the same vein, relaxation of government regulations during the economic depression crisis of the 1930s resulted in pioneer settlement of some young Keiyo men and their families in the area on top of the Elgeyo Marakwet escarpments, around Irong, and Chepkorio (Tarus, 1994; Chebet and Dietz, 2000). Elgeyo Marakwet Political Record of 1938 noted with concern that some enterprising natives had begun to cultivate large tracks of land beyond the established limits (KNA/DC/TAMB/1938). Additionally, Elgeyo Marakwet farmers started to cultivate maize as a food crop and potatoes as a cash crop (Chebet and Dietz, 2000). Field interviews revealed that, apart from crop cultivation, Elgeyo started to accumulate cattle due to the suitable ecology of the highland ecological zone.

Similarly, the people of Elgeyo Marakwet living in Kerio Valley cultivated maize on the ledges of the Elgeyo Marakwet escarpment and watered areas basically for household consumption (KNA/DC/ELGM/1/3). This concurred with Tarus (1994), who stated that maize cultivation was prevalent on the middle ledges and lower ledges of the escarpment in Elgeyo Marakwet District. It appears, therefore, that by late 1930s, Elgeyo Marakwet community had embraced cultivation of maize. However, it is noteworthy that in the Escarpment ledge and Kerio Valley ecological zones, colonial agricultural impact was limited. Land in these zones remained communal (Chemuok, O.I., 2022). In addition, introduction and adoption of pangas, axes, ploughs, and hand-operated maize mills in 1938 facilitated the expansion of agricultural land for large-scale crop cultivation in highland

ecological zone (Tarus, 1994). The widespread use of ploughs significantly augmented the cultivation acreage in the highland ecological zone (KNA DC/ELGM/1/4/1938–1939). At the same time, a few Elgeyo Marakwet people in highland ecological zone had become plough owners (KNA DC/ELGM/1/4/1938–1939).

By 1939, maize crop had gained popularity among the people of Elgeyo Marakwet due to a number of reasons. Unlike millet and sorghum, maize demanded less labour, especially during weeding and protecting it against birds' whey they ripen. Maize, which matured much quicker and did not require a lot of labour became more popular than millet and sorghum grains. Furthermore, colonial administrators favored maize because it released both men and women from the burden of millet and sorghum production and enabled them to seek wage labour in the settler farms (Zwanenberg, 1975).

Maize had the greatest impact on ecology, agro pastoral economy, and food security in Elgeyo Marakwet. Oral interviews with key informants revealed that production of maize limited local communities' ability to produce millet and sorghum, which were drought resistant food crops suited to their ecological conditions, which made them face increased food shortages (Arap Msafiri, O. I., 2022). Introduction and use of ploughs facilitated extensive maize cultivation (Tarus,1994). This intensified land exploitation for maize production for export, resulting to imbalanced agriculture, soil erosion, ecological degradation, and food insecurity (KNA/DC/ELGM/1/5/1940-42).

Use of ploughs in cultivation had significant environmental repercussions, including soil erosion, because it reduced vegetative cover by uprooting the rhizome grass. This grass recovers during short rains and served as good fodder for livestock (Cherop, 2019). Many

maize producers sought to expand their cultivation areas, totally disregarding ecological implications. Thus, introduction of maize, both for subsistence and commercial purposes, had a detrimental effect on the relationship between ecology and crop production.

The cultivation of Maize had disadvantage of exhausting soil fertility in that its large vegetative growth extracted more nutrients from the soil compared to other cereals such as sorghum and millet (Bowles, 1977). Similarly, introduction of maize has been argued to have underdeveloped African agriculture in the sense that it replaced more suitable crops (Muchoki, 1988). In Elgeyo Marakwet, maize cultivation imposed a monoculture system, replacing the pre-colonial practice of growing or intercropping a variety of crops such as millet, sorghum, and vegetables. Unlike traditional crops, maize and wheat could not be intercropped. This robbed the soil of its nutrients, upsetting the natural balance of soil fertility that had been maintained through intercropping in the pre-colonial period. Thus, introduction of maize created a crisis that ruined the existing ecosystems and agro-pastoral economy.

Ndege (2009) opined that by suppression and marginalization of indigenous subsistence production systems and depletion of traditional drought-tolerant crops during colonial period, led to decline in food crop production by Africans. Consequently, indigenous food crop production practices among Elgeyo Marakwet suffered a huge setback during colonial period. Colonial administration's lack of support for traditional food production resulted in a series of ecological disasters such famines, and food shortages.

By 1940, many people in Elgeyo Marakwet had acquired and owned pangas, axes, hand maize grinding mills and ploughs, which replaced traditional farm tools such as hoes (*Makombe*) and *Moor*s (Tarus, 1994). The introduction of these more effective tools, such as panga, facilitated massive clearance of virgin land for cultivation (Busienei, O.I., 2022).

These exposed the soil to agents of erosion, adversely affecting food production and food security (Tuitoek, O.I., 2022). Marakwet and Elgeyo communities were also affected by broader colonial concerns over soil erosion emanating from large-scale colonial cultivation (Anderson, 1984). By the early 1940s, new crops occupied 64 percent of the total Elgeyo Marakwet district (KNA/DC/ELGM/1/5/1940-42). Most of these crops consumed most of the ideal and suitable land, particularly highland ecological zone that Elgeyo Marakwet had relied on prior to colonialism.

In 1940s, demonstration plots, that is, headmen plots and seed plots that colonial administration attempted to introduce in 1918–1922, but failed, were revitalized, and their number increased (Chebet and Dietz, 2000). Similarly, British Government introduced cassava as a drought/famine-resistant crop in Kerio Valley ecological zone through these demonstration plots (Cherop, 2019). Agricultural officers in Elgeyo Marakwet established terrace demonstration plots and discouraged cultivation on steeper slopes and deforestation at the edge of Elgeyo Marakwet escarpment (Kipkorir, 1993). Key informants submitted that a colonial administrator named William Spencer demarcated a boundary (the community call it Spencer line) beyond which no human activity was permitted in escarpment ecological zone. This was done to check on deforestation and soil erosion (Chemuok, O.I., 2022).

Implementation of various terracing and soil conservation measures suggests that soil erosion had been largely overlooked by the colonial administration (Anderson, 1984). In the same vein, in 1941, for the first time, colonial administration initiated shamba plantation development (*Shamba system*) in Elgeyo Marakwet region as part of reforestation program in response to deforestation in highland Elgeyo Marakwet forest reserve (KNA DC/ELGM/1/5, 1940–1942). This initiative allowed farmers to cultivate crops while simultaneously planting and maintaining trees in the forest reserve (Limo, 2016). Oral interviews indicated that

Shamba system enabled them to cultivate maize, beans, and potatoes within the forest reserve, thereby increasing food production (Tallam, O., I., 2022).

In 1945, the District Commissioner of Elgeyo Marakwet District, Mr. D. Storr Fox, prohibited use of ploughs and restricted permits for their purchase by the people of Elgeyo Marakwet. He argued that use of ploughs had led to the depletion of land and a shortage of grazing areas (Tarus, 1994). He observed that ploughing had left insufficient grazing land for stock, causing unbalanced agriculture, soil erosion and food deficiency (KNA DC/ELGM/1/9/8, 1944–1945).

To check on crop production by Elgeyo Marakwet, the District Commissioner demanded that all agricultural produce had to be sold to government-appointed agents (KNA DC/ELGM/1/9/8, 1944–1945). This policy aimed to address soil erosion and to ensure that Elgeyo Marakwet agricultural production complemented rather than compete with settler agriculture (Tarus, 1994). Due to massive soil erosion, colonial officers were forced to introduce soil conservation measures through African Land Development Programme (ALDEV) between 1946 and 1954 (Hennings, 1972). These measures majorly targeted escarpment and Kerio valley ecological zones (Kipkorir, 1993). In Kerio Valley ecological zone, colonial administrations shifted their interest to upgrading Marakwet irrigation furrows (Cherop, 2019).

Under African Land Development Program (ALDEV), considerable sums of money were allocated for the development of irrigation in Marakwet (Davies and Moore, 2014). An assistant development officer was posted to Endo, Marakwet Kerio Valley to establish ridge and furrow along contours to prevent erosion and enhance efficient use of indigenous

irrigation (Kipkorir, 1993). Colonial officers attempted to upgrade the pre-colonial Marakwet furrow systems through use of concrete and plastic piping, intending to make them accessible to all users. However, these ALDEV-led irrigation interventions failed because they sought to substitute the pre-colonial system under *Kimwar* with a new system instead of strengthening the existing, effective traditional furrow irrigation system (Cherop, 2019). Similarly, ALDEV's efforts to introduce tractors for crop cultivation in Kerio Valley were unsuccessful (Davies and Moore, 2014). These programs, which included use of tractors, advocated for individual land ownership. This clashed with the pre-colonial Elgeyo Marakwet concepts of communal land tenure ownership, labour and kinship (Murkomen, O.I., 2022).

This study therefore submits that there were significant changes in traditional ecological management practices and crop production systems among the people of Elgeyo Marakwet. These changes were brought about by the introduction of new crops, particularly maize, new farm implements, land alienation, and settler farming activities. This transformation had a profound impact on the indigenous Elgeyo Marakwet agricultural economy. Colonialism played a central role in drastically restructuring long-established patterns of the Elgeyo Marakwet ecological management and crop production systems, which had previously adequately supplied food for subsistence within a well-managed ecological system.

Maize crop cultivation disrupted production of millet and sorghum, as well as the various ecological strategies used by the people of Elgeyo Marakwet to prevent ecological degradation and food shortages. This shift had a devastating impact on food security of the people of Elgeyo Marakwet, who produced food for consumption and stored the surplus for future use in the pre-colonial period. Thus, overcultivation of maize by both white settlers

and people of Elgeyo Marakwet contributed to ecological degradation and food insecurity in the region.

3.7 Colonial Transformation of Livestock Keeping, 1910- 1945

In the pre-colonial period, livestock was considered the hallmark of wealth among Elgeyo and Marakwet (Tarus, 1994; Chan'gach, 2011; Chesang, 1973; Kipkorir, 1993). Keeping of cattle and goats was popular among them (Chebet and Dietz, 2000; Cherop, 2020). The Elgeyo and Marakwet regarded livestock keeping as superior to cultivation (Massan, 1968). Livestock provided essential food supplements inform of meat, milk, and blood during times of food shortages (Kipkorir, 1973; Cherop, 2020; Chebet and Dietz, 2000). The community often resorted to slaughtering goats for food during periods of scarcity (Barar, O.I., 2022). However, contact with the British radically affected their agro-pastoral economy.

The establishment of colonial rule in Kenya, and particularly in Elgeyo Marakwet, directly or indirectly interfered with the pre-colonial pastoral economy and its utilization. Colonial government used all manner of tactics to diminish livestock holdings of the people of Elgeyo Marakwet. In 1910, colonial administration stationed in Eldama ravine in Baringo, introduced payment of hut tax in Elgeyo Marakwet (KNA/DC/TAMB/1/1/1911).

Introduction of taxes placed Elgeyo Marakwet's livestock economy on a negative trajectory. They were forced to give out or sell their livestock to white settlers in large numbers to raise the required revenue (Tarus, 1994). The continual sale of livestock to pay taxes significantly affected Elgeyo Marakwet livestock industry, as money for hut tax payment were almost entirely obtained through livestock sales. As a consequence, this forced sale led to further

depletion of livestock among the Elgeyo Marakwet. Defaulting in paying hut tax resulted to confiscation of animals (Ruto, O.I., 2022).

Similarly, petty crimes were resolved by levying fines in form of cattle (Chebet and Dietz, 2000). Cattle were also confiscated for 'crimes' committed individually and collectively (Tarus, 1994). Traditionally, cattle raiding was accepted economic activity among the Elgeyo Marakwet for building up large herds and restocking purposes after droughts (Cherop, 2020). However, between 1918 and 1919, colonial administrators halted cattle raiding, particularly between Keiyo, Maasai, and Tugen (KNA/DC/ELGM/2/1/1918–1919). To stop cattle raids, various stock theft ordinances were enacted, requiring those caught “stealing stock” to pay a fine ten times the value of the stolen cattle (Van Zwanenberg, 1975). Failure to pay the fine resulted in fine being imposed on their kin or the entire sub-location (KNA/DC/ELGM/2/1/1918-1919). The intention was to deplete Elgeyo Marakwet livestock economy to force them to provide labour in settler farms (KNA/DC/ELGM/2/1/1918-1919).

Surprisingly, despite existence of laws during the famine of 1918–19, the Elgeyo community raided the white settlers (KNA/DC/ELGM/2/1/1918–1919). Oral interviews with key informants noted that collection of hut tax and restrictions imposed by the District Commissioner on grazing on farms bordering their reserve also forced the community to raid settlers (Komen, O. I., 2022). In response, King's African Rifles organized a punitive expedition, and hundreds of cattle, sheep, and goats were seized from the Elgeyo Marakwet community (KNA, DC/UG/2/1). Confiscated livestock was distributed to the affected settlers and soldiers. Punitive expedition also resulted in razing of houses, granaries, cattle sheds, and food stores. This punitive action was aimed at frustrating Elgeyo Marakwet agro pastoral economy. To stop Elgeyo Marakwet people from accessing white settler farms in the highland

ecological zone, colonial authorities stationed police posts in peripheral parts of the reserves, such as Kolowa, Tambach, and Eldama Ravine in Baringo (Chebii, 2018).

Key informant interviews stated that cattle raids between the Elgeyo and Pokot communities were only meant to replenish livestock lost to drought or diseases (Kipkore, O.I., 2022). In the event of death during a raid, the raiding community was expected to compensate the other, an activity called *labai*. However, colonialism deliberately separated the two communities and introduced territorial boundaries (Cherop, 2019). In 1924, following the establishment of these boundaries, colonial administration forced the two communities to sign the Hosking-Buxton agreement, which made River Kerio the boundary between the two communities (KNA/DC/ELGM/1/1, 1920-1927; Kisaka; 2009; Murkomen, 2015).

The colonial government established ethnic boundaries, which included the white highlands and native reserves (Kisaka, 2009; Murkomen, 2015; Chebii, 2018). This division disrupted the longstanding coexistence of Marakwet and Pokot, who had shared ecological resources such as grazing fields and water points, especially in the Chesegon area, which had a permanent river and abundant pasture (KNA/DC/ELGM/1/1, 1920–1927; Kisaka, 2009; Murkomen, 2015). Despite occasional cattle raids, Marakwet and Pokot maintained ties through intermarriages (Cherop, 1976; Murkomen, 2015).

Additionally, creation of the inter-territorial boundaries not only restricted movement of people but also limited free access to grazing land, salt licks, and water (Sigira, O.I., 2022). These permanent ethnic boundaries had major ramifications for pastoral communities, as they were established without due regard to the seasonal ecological variations and demands of the nomadic lifestyles of the pastoralists (Kisaka, 2009). In the case of Elgeyo Marakwet, these

boundaries adversely affected ecological management and food production through pastoral economy.

Land is intrinsically linked with pastoral economy (Chesang, 1973; Kipkorir and Welbourn, 2008). Land possesses' mineral salts, water, and pasture, which are important for pastoral activities (Cherop, 2019). Colonial state felt that its vision of transforming Kenya into a prosperous European colony would remain unattainable as long as pastoralists continued to hold possession of some lands in the country (Mwikali & Tanui, 2021). To disrupt this dependence, colonialists used all manner of tactics to deplete their livestock, including alienation of grazing land (Kisaka, 2009). Land policies introduced by the colonial government marked the onset of a series of ordinances which eventually led to alienation of considerable grazing land from the indigenous people (Mwikali & Tanui, 2021). This removed them from their traditional range system and areas of food production.

The most important factor that affected Elgeyo Marakwet livestock industry during the colonial period was land alienation (Tarus, 1994; Chebet and Dietz, 2000; Chebii, 2018). In the pre-colonial period, by 1850, Elgeyo had been grazing on the Uasin Gishu Plateau and Elgeyo Marakwet highland ecological zone (Massan, 1968). However, in 1922, Keiyo were evicted from 328 square miles of forest to make room for European settlement (KNA/DC/ELGM/1/1, 1920–1927). Elgeyo Marakwet highland ecological zone, especially in Keiyo area, was alienated to E.S.M. Grogan Ltd (KNA/DC/ELGM/1/1, 1920–1927; Tarus, 1994). This left the community with approximately 72 square miles of grazing area for their livestock (KNA/DC/ELGM/1/1, 1920–1927; Tarus, 1994).

As a result, the Elgeyo lost their grazing lands and were pushed to Elgeyo reserve. This reserve proved inadequate and quickly became overstocked, making grazing points vulnerable. The outcome of this was ecological degradation and food shortages. Whenever cattle were found outside the designated "reserve limits," they would be confiscated and sold (KNA/DC/ELGM/1/1, 1920–1927; Ruto, O. I., 2022). Stichter (1982) opined that reserve policy confined African population to legally delimited areas, effectively circumscribing most African societies in *situ.* This situation was similarly observed in Elgeyo Marakwet.

With the establishment of settler farms in highland ecological zone, Elgeyo Marakwet people were cut off from access to *ng'enda* (salt licks) at Kipkabus, Kendur, and Kabelat, and water resources at Lake Sergoit (Chesang, 1973; Tarus, 1994). These resources were located in highland ecological zone. The only other available salt licks were found in Kerio Valley at N'gentui, Munyan, Melaan, and Chebilat, to mention a few (Tuitoek, O.I., 2022). The long distance travelled to reach these resources led to deaths of large number of cattle and caused ecological disruption through soil erosion on footpaths. Additionally, traditional saltlicks dried up as the natural pastures were cleared due to increased stocking of livestock (Tuitoek, O.I., 2022).

When the community protested, settlers prevailed by asserting that Keiyo cattle were infected with ticks and could transmit infection to their own livestock (Tarus, 1994). This situation contributed to decline in livestock production and food security. Elgeyo and Marakwet were marginalized and outrightly constrained by the Grogan Concession (Tarus, 1994; Chebet and Dietz, 2000). In the same vein, World Food Programme (2009) observed that households in ASAL areas practised livestock production to mitigate crop losses; however, they also experienced low numbers of livestock due to extended trekking in search of water and

pasture, which further degraded their environment and endangered future food production and food security. This disruption was a result of a strategic colonial policy aimed at depastoralizing the Elgeyo Marakwet society.

The Grogan Concession notably sandwiched Keiyo between the reserve and forest, areas to which they were not allowed access (Tarus, 1994; Chebet and Dietz, 2000). It appears that colonialists aimed at disrupting Elgeyo Marakwet livestock economy by depleting their livestock in order to force them to either into squatter or provide wage labour. These colonial practices exacerbated human-ecology relations in the pastoral areas, including in Elgeyo Marakwet (Chebii, 2018). The reduction in accessible land (a factor in livestock production) shrunk and populations of animals and people in restricted areas were congested against available resources, and acute competition for water and pasture in settlements became rampant. This caused ecological degradation and food shortages. In 1922, Elgeyo Marakwet were further marginalized by being pushed and confined to the "Keiyo reserve" and "Marakwet reserve" due to land alienation (Cherop, 2019).

In 1925, some colonial administrators argued that there was widespread evidence of land degradation in Kenya's pastoral areas that was mainly caused by overstocking and overgrazing (KNA/DC/ELGM/1/1, 1920–1927; Mackenzie 1998; Anderson 2003; Kisaka, 2009). These administrators emphasized the critical importance of restoring natural grass cover in the affected areas to sustain livestock and agricultural production (KNA/DC/ELGM/1/1, 1920–1927). Throughout the 1930s, pastoral areas, for example, Baringo, West Pokot, Elgeyo, and Marakwet, among others, were significantly affected by destocking policy (Kisaka, 2009).

Land pressure in African reserves would drive Africans into the white highlands prompted settlers to pressure colonial administration to come up with measures to address the “crisis” (Anderson, 2003). Destocking policy was, therefore, implemented by forced culling of African herds to prevent trespassing stock from spreading diseases to settler herds (Kisaka, 2009). Quarantine regulations were also established to restrict marketing of African livestock, to protect settler herds and flocks from diseases (Anderson, 2003; Kisaka, 2009). The intention of government to enforce a compulsory destocking policy was to reduce pressure on pastures in the African reserves (Kisaka, 2009). In Elgeyo Marakwet, this policy was implemented through introduction of taxes (cattle tax) and compulsory purchase of cattle (Tarus, 1994; Chebet and Dietz, 2000).

This destocking policy significantly undermined Elgeyo Marakwet’s ecological management, livestock reproduction, and accumulation cycles, which were intricately linked to their environment and pastoral economy. Colonial state exploited the notion of overstocking as a pretext to forcefully acquire animals from Elgeyo Marakwet people by levying them a cattle tax. Similarly, introduction of squatter system in the colonial period further affected African pastoral economy (Zeleza, 1986). Indigenous people, including the Elgeyo and Marakwet, engaged in colonial settler farming as squatters, with the hope of not only getting land to graze their livestock but also to receive their animals back as payment (Zeleza, 1986; Omwoyo, 2004).

Alienation land in Elgeyo Marakwet region by the Grogan Concession negated Keiyo's reliance on livestock for tax payment. The result of all these was that the narrow strip of reserve in the highlands became ecologically overstocked and overgrazed. This caused degradation of ecological resources and increased the necessity to dispose their livestock, and

seek squatter labour (KNA DC/ELGM/1/3/1933-1937). Due to pressure of land shortages, ecological disruption, the people of Elgeyo Marakwet found squatter labour to be a necessary alternative (Massan, 1968; Kanogo, 1987; Tarus, 1994). However, those recruited as squatters often had smaller herds of cattle in order to reduce grazing stress in the settler farms (KNA DC/ELGM/1/3/1933-1937).

Those who were unwilling to register as squatters devised strategies of grazing their cattle on settler farms or in the forest grades at night and early in the morning (Chesang, 1973; Tarus, 1994; Chebet and Dietz, 2000). However, when cattle were found grazing on the settler farms, in forests or outside the designated "reserves.", they were captured and held under the Diseases of Animals Ordinance (Kisaka, 2009). The confiscated animals were sold as a form of punishment (KNA DC/ELGM/1/3/1933-1937).

During the Second World War (1939–1945), the people of Elgeyo Marakwet were called upon to hand over livestock as their contribution to the 'war effort' (Tarus, 1994). This compulsory requisition of stock by the colonial administrators significantly hindered livestock expansion in the study area. This forcible removal of thousands of heads of cattle from Elgeyo Marakwet households removed a crucial element of their food production (Chebet and Dietz, 2000). However, it is important to note that Elgeyo Marakwet people were generally unwilling to surrender their cattle for the “war effort”. In the same period, colonial government also set up a supply board to purchase cattle (Tarus, 1994). This was aimed to coerce reluctant communities of Keiyo-Marakwet District, particularly those living in the escarpment ledges and Kerio Valley ecological zone, to sell their cattle (Massan, 1968).

To achieve their goal, colonial administration directed that livestock requisitioned for war effort to be branded (Tarus, 1994). However, Elgeyo Marakwet people resisted the branding by hiding their cattle in Kerio Valley ecological zone from being branded, as the intentions behind branding livestock were unclear to them (Sawe, O.I. 2022). On the contrary, it was observed that branding one's stock was due to decreasing stock supply for military consumption, which required procurement of specifically branded livestock from peasant' cattle sheds by the livestock purchaser (Tarus, 1994). Cattle that were hidden in the Kerio Valley ecological zone were inaccessible to government agents (Massan, 1968).

In 1938, livestock economy in Elgeyo Marakwet faced a turbulent period due to the confinement of cattle on escarpment ledges and Kerio Valley ecological zone (KNA/DC/ELGM/1/4/1938–1939). This was exacerbated by overgrazing, as the community evaded compulsory requisition and branding of their stock (Arap Ego, O.I., 2022). This led to ecological degradation, decline in livestock economy, and food insecurity. Moreover, livestock diseases such as Black Quarter, Rinderpest, and East Coast fever killed many livestock, especially calves (KNA/DC/ELGM/1/5/1940–1942). Between 1940 and 1942, livestock population in Elgeyo Marakwet was reduced from 300,000 heads to 200,000 heads (KNA/DC/ELGM/1/5/1940-1942). This decline was attributed to the ecological disruption and colonial policies on livestock economy imposed on the people of Elgeyo Marakwet.

Based on the discussions, it can be discerned that colonial policies significantly disrupted the pre-colonial Elgeyo Marakwet ecological set-up and livestock economy. These disruptions were caused by land alienation which limited their grazing areas through various legislation like Grogan Concession, taxation, destocking policy, squatter system, and settler farming.

These colonial economic policies and activities led to ecological degradation and undermining livestock economy as a means of livelihood.

3.8 Summary

This chapter has examined the impact of colonial policies on the Elgeyo Marakwet ecosystem, food production and food security. Key colonial polices included land alienation, wage labour demands, introduction of new crops, and the impact of the Second World War. These policies disrupted traditional land use, marginalized indigenous knowledge, and weakened social institutions that once ensured ecological balance and food security. Before colonization, the Elgeyo Marakwet had a deep understanding of their environment, which was integral to their sustainable agro-pastoral practices. However, colonial policies, such as land alienation, forced the community into less sustainable ecological zones, resulting in soil erosion, vegetation depletion, and loss of biodiversity.

Additionally, shift to monoculture and the neglect of traditional practices like crop rotation further deteriorated the land. Imposition of taxes and forced labour diverted attention from sustainable land management, exacerbating environmental degradation. The confiscation of livestock and the disruption of traditional grazing practices severely undermined the community's agro-pastoral economy. Moreover, participation in the Second World War compounded these issues by depastoralizing the economy and draining labour, leading to overgrazing and reduced agricultural productivity. Overall, colonial policies imposed on the Elgeyo Marakwet led to significant ecological damage, disrupted traditional knowledge and practices, and heightened food insecurity, marking a stark departure from the community's pre-colonial resilience.

CHAPTER FOUR
ELGEYO MARAKWET AGRO-PASTORAL ECONOMY AND ECOLOGY DURING THE POST COLONIAL PERIOD, 1963-2013

4.1 Introduction

This chapter has analyzed post-colonial government policies and legislations and their influence on ecology and agro-pastoral economy of the people of Elgeyo Marakwet between 1963 and 2013. Specifically, it has examined policies and legislations implemented by the government of Kenya that are pertinent to agro-pastoral regions, including regional commitments and assessed their impact on various agro-pastoral activities and food security in the post-colonial Elgeyo Marakwet.

4.2 The Post-Colonial Government Policies and Legislations on Agro-pastoral Economy

The success or failure of agro pastoral economy and ecological management is significantly influenced by government policies and legislations. Formulation and implementation of these policies and legislations can either enhance or negatively impact agro pastoral economy, ecology and food security. Government holds the responsibility to ensure equitable development across the state (Shanguhyia, 2008; Omondi & Odhiambo, 2009; Kisaka, 2009). Governance is, therefore, central to societal development, with government policies playing a crucial role and exerting a tremendous impact on socio-economic development and security of livelihoods (Omondi & Odhiambo, 2009).

Government policies and legislations, therefore, establish the groundwork for addressing socio-economic issues by setting priorities and creating the necessary structures, institutions, and frameworks for government action. These policies mobilize and direct efforts and resources towards achieving specific policy objectives (Omondi & Odhiambo, 2009). They

also serve as blueprints for government actions, determining the allocation of resources and the access that the targeted group have to these resources (Shanguhyia, 2008). Therefore, it is important to question the policy context in seeking to understand government policies and legislations on the development of agro-pastoral areas, including Elgeyo Marakwet, and their impact on ecology and food security.

Upon attaining independence in 1963, the first administration inherited a nation marked by unbalanced development, with policies that predominantly favored the white settler community (Shanguhyia, 2008; Kinyanjui, 2016). The new administration committed to implementing policies that would benefit the African community (Shanguhyia, 2008). The principal development strategies were articulated in Sessional Paper No. 10 of 1965, titled *African Socialism and its Application to Planning in Kenya* (Keya, 1992; Shanguhyia, 2008; Kisaka, 2009). This development policy was grounded in economic growth through public and private sector investment (Omiti and Irungu, 2002; Shanguhyia, 2008; GOK, 2021). The policy emphasis was directed towards regions with high and medium potential, where it was believed that development could be rapidly achieved (Ochieng, 1995; Shanguhyia, 2008)

Despite the existence of this policy, arid and semi-arid lands (ASAL), such as Elgeyo Marakwet areas continued to receive little or minimal government attention in post-colonial Kenya, mirroring the neglect experienced during the colonial era (Bernard, 1985; Keya, 1991; Kisaka, 2009; GOK, 2010; Cherop, 2019). As a result, while poverty and food security were decreasing in other parts of Kenya, it continued to rise in the ASAL regions (Omiti and Irungu, 2002; GOK, 2010). Since independence, Kenya has had a dualistic system of land law, one under Crown and Trust Land and the other under customary land law, which was based on socio-economic practices of the various tribes (Omiti and Irungu, 2002;

Shanguhyia, 2008). Land Act of Kenya (CAP 280) classified all pastoral areas in Kenya under communal ownership, governed by customary land law (Omiti and Irungu, 2002).

Under Customary Land Law, every member of the community has an equal right to access and utilize communal land, with no individual possessing the authority to own, buy, or alienate it (Jackson, 1992; Omiti and Irungu, 2002; Shanguhyia, 2008; Kisaka, 2009). The right to access and use communal land is governed by various factors, including kinship, ethnicity, status, and residence, which have been established historically as a result of alliance, collaboration and competition between groups (Hesse & Trench, 2000; Omiti and Irungu, 2002). As a consequence, utilization of communal land often suffers from overstocking and overgrazing, as the primary motive of the pastoralist is to keep as many livestock as possible (Hardin, 1968; Omondi and Irungu, 2002). This resulted to problems associated with rivalry overgrazing areas (Roberts, 1963).

Between 1974 and 1990, Kenyan government developed various regional development policies and strategies aimed at achieving spatial balance in development amongst and within different regions of the country (Kinyanjui, 2016). Six Regional Development Authorities (RDAs) were established, which were based on rivers and large water-body basins and covered the whole country (Omiti and Irungu, 2002; Kisaka, 2009; Kinyanjui, 2016). These RDAs include Tana and Athi Rivers Development Authority (TARDA) established under Act Cap 443 of 1974; Kerio Valley Development Authority (KVDA) established under Act Cap. 441 of 1979; Lake Basin Development Authority (LBDA) established under Act Cap 442 of 1979; Ewaso Ng'iro South Development Authority (ENSDA) established under Act Cap 447 of 1989; Ewaso Ng'iro North Development Authority (ENNDA) established under Act Cap

448 of 1989; and Coast Development Authority (CDA) established under Act Cap 449 of 1990 (GOK, 2010; Kinyanjui, 2016).

These six RDAs were established with the overarching objective of ensuring optimal exploitation of river and water body basin resources to promote equitable, balanced, and sustainable socio-economic development throughout the country (Kinyanjui, 2016). Additionally, RDAs have been involved in implementation of integrated programmes and interventions of strategic national importance, ensuring that resources in these regions are utilized in the most optimal and sustainable manner with minimum duplication of efforts and resource use conflict (GOK, 2010; Kinyanjui, 2016).

In 1978, Kenya's second post-independence administration formulated the first ASAL policy, which was implemented in 1979 (Shanguhyia, 2008). This policy led to execution of various agro-based projects funded by external donor agencies in a number of ASAL districts (Keya, 1991). However, the policy did not succeed in implementing of its programmes. According to Shanguhyia (2008), ASAL policy of 1979 failed because it lacked the input of ASAL communities and focused on technical issues such as irrigation, land degradation, and perceived problem of nomadic pastoralism. The policy also attempted to settle pastoralists in irrigation schemes and group ranches (Keya, 1991; GOK, 2004; Shanguhyia, 2008). Despite these efforts, the approach did not achieve sustainable development in ASAL areas (Kisaka, 2009).

In 1981, the government of Kenya formulated its first National Food Policy in response to first severe post-independence food crisis of 1980, which necessitated large imports of grain (Shanguhyia, 2008). This policy was promulgated in Sessional Paper No. 4 of 1981, with its

main objective being to ensure an adequate supply of food for all. According to Omiti and Irungu (2002) and Shanguhyia (2008), prior to 1981, Kenya did not have dedicated national food policy. Food security issues were addressed within the broader policies of agricultural sector. Thus, this national food policy articulated in Sessional Paper No. 4 of 1981 emphasized food production to meet the nation's food needs:

> The overall objective of this policy will be to maintain a position of broad self-sufficiency in the main foodstuffs in order to enable the nation to be fed without using scarce foreign exchange on food imports (GOK, 1981).

The policy also acknowledged the importance of promoting drought-tolerant food crops such as millet, sorghum, and pulses in ASALs to enhance food security. In response to the severe food crisis of 1980s, government initiated economic reforms such as Structural Adjustment Programs (SAPs) (Omiti and Irungu, 2002; Shanguhyia, 2008; GOK, 1981). SAPs were a series of economic and political reforms introduced by World Bank and International Monetary Funding in developing countries, aimed at fostering economic growth and development (Omiti and Irungu, 2002; Shanguhyia, 2008; Kisaka, 2009). These programs sought to achieve economic growth and macroeconomic stability by reducing government interventions in various sectors (Omiti and Irungu, 2002).

SAPs initiatives were motivated by a rejection of the role of the government as the sole and predominant agent for driving social change and development (Ellis, 2000). Thus, SAPs advocated for policy measures such as privatization, civil service reform, cost sharing, removal of input subsidies, and market liberation (Shanguhyia, 2008). Sessional Paper Number 4 of 1981 outlined development objectives and policy frameworks aimed at

garnering support from development partners by incentivizing governments that adopted these reforms (GOK, 1981). However, reduction in government involvement in marketing of livestock and livestock products, left pastoralists vulnerable, to exploitation by middle men, exacerbating the fragmentation of pastoral livelihoods. Hence, these policy reforms also contributed to the continued disintegration of pastoral livelihoods (Omiti and Irungu, 2002). Thus, Kenyans in ASAL areas, including Elgeyo Marakwet, continued to experience chronic and persistent food crises despite efforts made by governmental and non-governmental organizations to address these challenges.

In 1983, a new approach called District Focus for Rural Development (DFRD) was introduced (Kisaka, 2009; GOK, 1983). DFRD initiative centralized planning, implementation and management of rural development at the district level (GOK, 2021). It aimed to bring administrative services closer to the populace, fostered greater community participation in decision making process, and facilitated better identification of local priorities (Kisaka, 2009; GOK, 1983). Agriculture programs and projects were prioritized through district-level structures such as District Agricultural Committees (DACs) and District Development Committees (DDCs) (Kisaka, 2009; GOK, 1993). In 1994, national food policy, initially outlined in Sessional Paper No. 4 of 1981 underwent revision to promote market economy, albeit within a limited scope (GOK, 1994).

In the same vein, in 1997, government formulated sessional paper No. 2 of 1997 on industrial transformation to the year 2020 (GOK, 1997). This paper mapped out strategies for Kenya's industrial developments and articulated government's role in creating a supportive environment for private sector to thrive (GOK, 1997). It aimed to achieve enhanced stability, security and investor confidence through effective macroeconomic management and

consistent, equitable policy implementation. This policy primarily emphasized industrialization and arable crop production, with limited consideration given to specific challenges faced by pastoralists and their livestock (Omiti and Irungu, 2002; Shanguhyia, 2008).

History of agricultural policy formulation in Kenya since independence is closely linked to entrenchment of colonial government's first legislative body, which was established to allocate land resources through a series of ordinances that promoted settler farming and agriculture at the expense of African agriculture (GOK, 2016). Therefore, development and agricultural reforms in post-colonial Kenya, including in Elgeyo Marakwet, have been predominantly influenced by colonial administration policies, particularly in areas such as land tenure, agricultural research, livestock and cash crops development, marketing and pricing policies. Similarly, contemporary agricultural policy formulation focuses on increasing productivity and income growth, as well as enhancing food security (Alila & Atieno, 2006).

In 2002, Kenya's third post-independence administration embarked on reviewing several government's policies as the first step towards fulfilling their promises to provide basic needs such as food and education (Shanguhyia, 2008). These policies included Economic Recovery Strategy for Wealth and Employment Creation (2003), Poverty Reduction Strategy (2003), National Policy for the Sustainable Development of Arid and Semi-Arid Lands of Kenya, Ministry of Livestock and Fisheries Development Strategic Plan (2003–2007), Strategy for Revitalizing Agriculture (2002–2004), Kenya Rural Development Strategy 2002–2015 and National Food and Nutrition Policy (2006), launch of Ministry of Northern Kenya and other Arid Land Development (2008), launch of Kenya Vision 2030 (2008), and Agricultural

Sector Development Strategy (ASDS 2010–2020) (Kipuri & Ridgewell, 2008; Shanguhyia, 2008; GOK, 2016). These policies outlined strategies for addressing specific issues that afflict Kenyans, such as poverty and food security. Most of these policies targeted issues affecting communities in ASAL areas, and this thesis chapter focuses on how ecology, agro pastoral economy and food insecurity in Elgeyo Marakwet are addressed in these policy documents and legislations.

On August 27, 2010, Kenya promulgated a new constitution (GOK, 2010). Key features of this Constitution include establishment of National and County governments with distinct functions (GOK, 2010). The Constitution recognizes the importance of natural resources and their use for posterity. In Article 43(c) under the Bill of Rights, the Constitution stipulates that "every person has the right to be free from hunger and to have adequate food of acceptable quality" (GOK, 2010).

Article 60 (1) (c) emphasizes sustainable and productive management of land resources, while Article 69 (1) (b) stresses achievement and maintenance of at least 10% tree cover of the land area of Kenya (GOK, 2010). The Fourth Schedule of the Constitution delegates specific agricultural functions to the County governments. Elgeyo Marakwet County is the product of this Constitution; thus, this study examines agro pastoral economy as a devolved function as from 2010 and evaluate the measures the County government is putting in place in relation to agro pastoral production and food security up to 2013.

4.3 The Post-Colonial Land Tenure Changes and Elgeyo Marakwet Agro Pastoral Economy

After Kenya gained its independence in 1963, land consolidation, introduced before independence, remained a major focus of the new government's policy (Kisaka, 2009). Colonial legal framework and ordinances for land administration which protected private land rights and regulated access to land, largely remained unchanged (Okoth-Ogendo, 1990; Wasike, 2018). According to Kanyinga (1997), independent Kenyan government introduced policies on land tenure security through implementation of Registered Title under the Kenya Land Act of 1963.

In 1965–1966, the independent government established a commission on Land Consolidation and Registration to explore ways of expediting land consolidation (Kisaka, 2009; Wasike, 2018). The Commission recommended that land rights be determined through the process of land adjudication (Okoth-Ogendo, 1990). As a result, Land Adjudication Act was enacted in 1968 with the intention of providing individuals with security of tenure over their land, thereby promoting better land use management, enhancing agricultural productivity, and reducing land conflicts (Okoth-Ogendo, 1990; Kisaka, 2009). Government's goal with land adjudication was to issue landowners with title deeds (certificates of ownership) to make it possible for them to secure loans from financial institutions to develop farming enterprises (Okoth-Ogendo, 1990). Typically, farmers were required to use these title deeds as collateral with banks or other credit institution to safeguard against loan defaults (Kisaka, 2009).

In Elgeyo Marakwet, the process of land adjudication was slow (KNA/DC/ELG/1965–70). Land adjudication fee was high, making it expensive, leading to reluctance among the local population to pay (Komen, O.I., 2022). This is evidenced by a report from the Elgeyo

Marakwet District Commissioner, which noted the alarmingly low rate of payment for land consolidation, with some locations, such as Irong in Keiyo and Endo in Marakwet, described as particularly pathetic (KNA/DC/ELG/1965–70). However, from early 1970s, transition from traditional land tenure system to individual freehold or leasehold had been implemented in some parts of Elgeyo Marakwet, particularly in the highland ecological zone, which became a settlement scheme after the departure of colonialists (KNA/DC/ELG/1965–70).

In the highland ecological zone of Elgeyo Marakwet, just like during colonial settler farming, the independence government concentrated its efforts on economic developments as compared to other parts. This emphasis was due to the zone's suitability for arable farming and human settlement (Chebet and Dietz, 2000). Little attention was given to escarpment and the Kerio Valley ecological areas (Chebet and Dietz, 2000).

Land Adjudication process in Elgeyo Marakwet involved Survey Department, District Land Board, and Council of Elders and Chiefs (KNA/DC/ELG/1965–1970). The procedure encompassed declaration, gazetting, survey, demarcation, and registration of land (Okoth-Ogendo, 1990). According to Elgeyo Marakwet annual report, 1965 and 1970 marked periods of significant adjustment and reorganization of the existing traditional land tenure to fit with the new land tenure system and economic set up (KNA/DC/ELGM/1965–1970). Land in the highland ecological zone, previously owned by the settlers (white farmers) was made available to some of the indigenous people through settlement schemes. This was done to ease population pressure in Kerio Valley ecological zone (Tarus, 1994). Elgeyo Marakwet people who lived in Kerio Valley and escarpment zones of the district moved and took advantage of the newly opened-up settlement schemes in areas formerly occupied by white settlers (Chebet and Dietz, 2000).

Key informant Interviews revealed that some of the people of Elgeyo Marakwet secured land in the highland ecological zone in the official settlement schemes such as Ainabkoi, Elgeyo boarder, Kamenti, Lelan, Cherangany and Kaptagat, among other settlement schemes. However, majority of the people secured land by either buying it or occupying it while awaiting official allocation (Sawe, O.I., 2022). Interestingly, oral interviews indicated that between 1965 and 1970, highland inhabitants organized themselves collectively (*kipagenge*) to clear forested part of highland ecological zone. This communal effort enabled them to open up and access more land for agro-pastoral production (Ruto, O.I., 2022).

By late 1970s, approximately 30% of land in Elgeyo Marakwet was under adjudication (Tarus, 1994). However, it is notable that there was little or no land adjudication in Kerio Valley ecological zone. The prospects of this area were not regarded as very promising due to the difficult topographic nature of Kerio Valley land (Chebet and Dietz, 2000). Communal land ownership posed an issue as clan land could not be registered under individual title deeds (Omiti & Odhiambo, 2009; Chebet & Dietz, 2000). However, between 1971 and 1976, government attempted land adjudication in some parts of the southern part of the Kerio Valley ecological zone of Elgeyo Marakwet region due to the discovery of fluorspar mineral in 1967 in that area (KNA, DC/ELGM/1978).

This was an attempt by the government to keep the remaining Kerio valley inhabitants by providing them land security, which would enable them to adopt modern farming methods and prevent their migration to the highland ecological zone (Chebet and Dietz, 2000). However, this was short-lived. In 1979, Fluorspar Mining Company of Kenya was placed under receivership due to a financial crisis, which forced the company to close (Chebet and

Dietz, 2000). This slowed down and eventually stopped land adjudication process in the area. Thus, supposed agricultural transformation that followed land consolidation in post-independence Kenya had, by the 1980s, had touched only a minority of the smallholdings of Kenya in any way (Kisaka, 2009).

By early 1990s, land adjudication had been extensively done in Elgeyo Marakwet, particularly in highland ecological zone of Kapcherop, Lelan, Cherangany, Ainobkoi, Chebiemit, Kapchemutwa, Kamariny, Kaptagat, and Kapsowar (Ruto, O.I, 2022). Despite the government's perceived direct relationship between land adjudication and crop production on one hand and livestock keeping on the other, it turned out to be contradictory (Kisaka, 2009). Land adjudication policy, which introduced an individual land tenure system, that is, land could be bought and sold like any other commodity by any member of the Kenyan community, led to sub-division of land, predominantly from fathers to sons, in Elgeyo Marakwet (Sawe, O.I., 2022).

In the study area, the pre-colonial clan land was divided among extended families by clan elders. These families further sub-divided land into nuclear family units through inheritance, without any formal registration documents (Tuitoek, O.I., 2022). This practice significantly impacted the pre-colonial Elgeyo Marakwet land tenure system and agro-pastoral economy, undermining traditional resource management institutions related to ecology, agro-pastoral production, and food security. It also disregarded customary land rights, not recognized as ownership (Sigira, O.I., 2022).

The size of the household farm has a significant relationship with household food security, as larger household farms tend to produce more food (Orodho, 1998; Esenu, 2006). However,

due to extensive land sub-division in Elgeyo Marakwet, many individual family members now possess very small pieces of land, limiting agro-pastoral production and adversely affecting indigenous ecological conservation practices such rotational grazing, fallow farming and shifting cultivation compromising food security. This was contrary to government policy argument that private land tenure system and individualized titles would ensure increased agricultural production and food security due to security of tenure.

In the study area, individual land tenure system has led to the excessive sub-division of land into small and sometimes uneconomical portions, reducing land size available for agro pastoral production. Key informant interviews revealed that, as a result of land registration, individuals in Elgeyo Marakwet who had acquired land titles were already selling land, which was previously family or clan land (Ruto, O.I., 2022). Thus, land, which was the foundation of wealth accumulation and survival through agro-pastoral production in the pre-colonial Elgeyo Marakwet, became commercialized and would be sold and bought like other moveable property. This commercialization of land increased land sub-division beyond points of ecologically and economically sustainable for agro-pastoral production, negatively affecting the indigenous ecological management and conservation practices, household food production systems and food security. Land is a crucial asset in agricultural production (Cherop, 2019). Its sub-division limits availability of productive land and poses a significant constraint to increased food production (Kinyua, 2004; Esese, 1990).

Similarly, land sub-division has led to decreased livestock mobility, disrupting traditional rotational grazing systems between Kerio Valley and escarpment ecological zones, which were essential for adaptability to rainfall fluctuations in the pre-colonial Elgeyo Marakwet. Chesang (1973) and Kjekshus (1977) observed that systematic erosion of indigenous socio-

economic structures in agro-pastoral communities through loss of access to land and natural resources, traditional knowledge, social organization, and animal mobility often led to increased pressures on the available resources. Over-exploitation of vegetation and soil resources, combined with lack of nutrient input and time to recover, has significantly contributed to increased rates of soil erosion and ultimately land degradation (William, 2019). In Elgeyo Marakwet, due to land fragmentations and population pressure, there is encroachment on the escarpment ecological zone to create room for settlement and agro-pastoral economy, this disrupted water catchment areas and ecological balance of the escarpment zone, consequently, contributing to reduced stream and river war in Kerio valley for agro-pastoral production and food security.

By 2000, most land in the Kerio Valley ecological zone was still governed by communal land tenure (Kipkorir & Kareithi, 2013; Cherop, 2019). Under the Land Act (Cap 280) laws of Kenya, this tenure system grants every member of the community equal right of access and use of land, prohibiting individual ownership, purchase or alienation of land (Jackson, 1992; Omiti & Irungu, 2002; Shanguhyia, 2009). In the post-colonial Elgeyo Marakwet, communal land has been overexploited through overgrazing and overcultivation (Kenneth, O.I., 2022). Thus, land in Kerio Valley and escarpment ecological zones suffers from the “tragedy of commons” phenomenon, due to problems associated with competition for land for agro-pastoral production leading to overexploitation of land resources, thus ecological disruption.

Communal land tenure in the area has also hindered intensive farm management, particularly in terms of effective mechanization and application of modern farming techniques such as crop rotation, soil and water management, and use of fertilizers or manure to boost crop production (Cherop, 2019). These challenges are further exacerbated by land conflicts, which

have affected agro pastoral economy. As a result, agro pastoral productivity has declined, contributing to problem of food shortages (Gitu, 2004). Additionally, lack of title deeds has restricted the inhabitants of Kerio Valley ecological zone from accessing credit facilities necessary for land investment to boost their agricultural production and food security.

Land adjudication and land sub-division led not only to ecological degradation, but also land conflicts, especially in Kerio Valley ecological zone (Kiptarus, O.I., 2022). There is increased competition among young people over communal land and one clan against another, which has led to conflicts. These conflicts have been accelerated by increase in population and the desire to own and control individual land for economic production or to sale. This contrasts with the pre-colonial period, where land distribution, ownership, and use were controlled by elders (Maiyo, O.I., 2022).

Control of land brings economic power, which often serves as the basis of social power (Ndege, 1987; Orodho, 1998; Wangari, 1998). Land conflicts in Kerio Valley ecological zone in Elgeyo Marakwet, have created insecurity, adversely affected agro-pastoral production and consequently reduced food production and increased food insecurity. The discovery of oil reserves in Turkana County in 2012 by Britain's Tullow Oil Company heightened hopes for similar discoveries in Elgeyo Marakwet, especially in Kerio Valley ecological zone. This prospect accelerated competition, sub-division, and selling of clan land in the region in anticipation of compensation, which intensified clan conflicts (Cherwon, O.I., 2022). These conflicts created an unfavorable environment for agro pastoral economy and food security.

Furthermore, those who had moved up the Kerio Valley in the 1960s to buy fertile land or obtain land through settlement schemes arrangement and settle in the highland ecological

zone at independence, returned after the discovery of oil reserves in Turkana County in 2012 to claim their ancestral land in Kerio valley ecological zone (Kenneth, O.I., 2022). The pre-colonial stones that served as beacons or land boundaries between different clans had been removed (Koech, O.I., 2022). This removal led to disputes over clan land ownership, due to lack of clear land boundary markers between the different clans in Kerio Valley ecological zone. The insecurity caused by these land disputes not only led to loss of lives, but also created an insecure environment for ecological management and conservation practices, agro pastoral economy and food security.

This study, therefore, submits that the pre-colonial communal usage of land and resources, which was vital for ecological management and conservation practices, agro pastoral production and food security, has been heavily threatened by the government policies and legislations on land tenure system since independence. These changes in land tenure system encompass the most significant ecological concerns of human population today, including climate change and biodiversity loss in Elgeyo Marakwet. Land tenure change, in the long run, has affected how the Elgeyo Marakwet communities conduct their economic activities, such as ecological management and conservation practices and agro pastoral production for food security, due to the adverse effects of land tenure change.

The County Government of Elgeyo Marakwet, in its Integrated Development Plan (CIDP) for the period 2013–2017, outlined focus areas on land demarcation, adjudication and registration (GOK, 2013). It proposed several targets to be achieved by 2017 such as fast-tracking processing of title deeds to achieve 85% land owners having title deeds and adjudicate 50% of all sections of land to reduce conflicts by communities affected in the County.

4.4 The Post-Colonial Government Irrigation Schemes

In 1966, independent government established National Irrigation Board (NIB) by an Act of Parliament, No. 13 of 1966 (KNA, DC/ELGM/1966). NIB was charged with the responsibility of developing, controlling, and improving national irrigation schemes across the country (KNA, DC/ELGM/1966). Among the public irrigation schemes in Kenya that were brought under the jurisdiction of NIB in 1966 were Perkerra, Mwea, Tana (Hola), West Kano, Ahero, Bunyala, and Bura (Ruttoh, 1988). However, NIB mainly concentrated on developing large-scale public irrigation schemes such as Mwea-Tebere, Hola, and Perkerra irrigation schemes, ignoring smaller irrigation schemes such as Marakwet indigenous furrow irrigation schemes (Cherop, 2019).

Moreover, between 1974 and 1989, the government formulated policies aimed at establishing regional development authorities to oversee and coordinate regional development initiatives across different regions (Ruttoh, 1988; Kisaka, 2009)**.** This led to establishment of various development authorities such as Tana and Athi Rivers Development Authority (TARDA), Lake Basin Development Authority (LBDA), Kerio Valley Development Authority (KVDA), Ewaso Ng'iro North River Basin Development Authority (ENNDA), Ewaso Ng'iro South Development Authority (ENSDA) and Coast Development Authority (CDA). These river/lake development authorities were state run parastatals and were commissioned to initiate and coordinate regional development activities (Kisaka, 2009).

In 1977, the government established Irrigation and Drainage Branch (IDB) under the ministry of agriculture (KNA, DC/ELGM/1977). IDB’s mandate was to promote, guide and develop small-scale irrigation schemes sponsored by both governmental and non-governmental

entities (Ruttoh, 1988; Kisaka, 2009). However, according to key informant interviews, Marakwet community did not benefit from technical or financial assistance from IDB to enhance or rehabilitate their indigenous irrigation furrows (Cherwon, O.I., 2022).

KVDA was established by an Act of Parliament CAP 441, No. 14 of August 31, 1979 (KNA, DC/ELGM/1979). The aim of KVDA was to initiate, plan, and steer agricultural development, create employment opportunities along Kerio valley basin through establishment of agricultural projects, demonstrate better farming methods, particularly through the use of modern irrigation technology, and undertake experimental activities on crop production (Ruttoh, 1988). Its operation area included Arror and Tot locations in Kerio Valley ecological zone (Cherop, 2019). These areas fall in Elgeyo Marakwet region. The authority established Arror Irrigation Project in 1983 (Cherop, 2019).

Key informant interviews revealed that KVDA was the first government institution to establish agricultural farms in Kerio Valley, Marakwet, to ensure food production and food security (Sigira, O.I, 2022). This was to be achieved through cultivation and establishment of demonstration plots for a variety of crops including maize, sorghum, cowpeas, green grams, groundnuts, chillies, cotton, orchards, and vegetables such as kale (’sukuma-wiki'), cabbages, tomatoes, onions, cassava, sorghum, maize, finger millet, green grams, bananas, and mangos (Kibowen, O.I., 2022).

KVDA started with rehabilitation of Kipkat furrow, which had been abandoned in 1960s (Soper, 1983). The community had abandoned this furrow after it was severely damaged by floods in 1959, beyond their capacity to repair (Cherwon, O.I., 2022). KVDA undertook clearing, cleaning, widening, and reinforcing the furrow with cement downstream to

Kaimuchuk area, where it had originally extended during the pre-colonial period (Cherwon, O.I., 2022). KVDA further extended the furrow to Kerio valley floor (Soper, 1983). In recognition of KVDA's efforts to extend the furrow to Kerio valley floor, Marakwet community formally transferred ownership and responsibility for Kipkat furrow to KVDA (Sigira, O. I, 2022). This furrow was bigger in size and mostly reinforced by cement compared to those of Marakwet clans. Thus, represents transformation in Marakwet irrigation systems due to external intervention.

Around 1983, efforts were made to rehabilitate and reconfigure Marakwet irrigation furrows systems to enhance its efficiency (Soper, 1983). For example, KVDA intervened jointly with Marakwet community to repair irrigation furrows and their intakes in case of furrow breakage, aiming to increase water flow volumes (Ruttoh, 1988). This collaborative initiative involved regular collective fundraising and repair of concrete irrigation structures across Marakwet Kerio valley (Davies et al., 2014).

KVDA assistance was largely in the form of cement and technical manpower, while on the other hand, Marakwet community provided labour and funds for repairing the furrows. This arrangement proved costly and discouraged community participation in repair and maintenance of the furrows (Davies et al., 2014). Key informant interviews revealed that this method of repairing furrows was ineffective and inefficient compared to the pre-colonial practices managed by *Kimwar*, as locals often failed to participate in repairs without the enforcement mechanisms, such as the denial of furrow water, that existed in the pre-colonial times (Sigira, O.I., 2022). Thus, external intervention by KVDA, which aimed at improving furrows through cementing, was unsuccessful and disrupted communities' traditional ecological management of the furrow systems and food production.

As a result of the failure to repair irrigation furrows, coupled with ecological changes, there were seepages and leakages in Marakwet-owned furrows, adversely affecting agro-pastoral production and food security. It is also important to point out that, due to shortage of irrigation water, Marakwet households resorted to illegally drawing water from KVDA's Kipkat furrow to irrigate their farms (Sigira, O.I., 2022). To curb this, KVDA employed guards to deter illegal water abstraction (Ruttoh, 1988). This measure created conflict between the community and KVDA, which led to violence that negatively affecting traditional irrigation management based on ecological knowledge of the area, agricultural production, contributing to food shortage (Kirop, O.I., 2022). Arror Project monthly report for July 1987 indicated that a KVDA employee guarding the furrow was stoned and injured by individuals illegally abstracting furrow water. This conflict hindered establishment of irrigation projects that could have contributed to ecological conservation, agro-pastoral production and food security.

The breakdown of Kabonon-Kapkamak furrow in 1983 halted crop production in an area once renown for agricultural productivity (Soper, 1983). Besides water conflicts, KVDA’s irrigation programs were further affected by seasonal fluctuation of river water levels, especially during seasons of greatest need for irrigation water. To solve this problem, KVDA sought assistance from local administration to curtail illegal water abstraction from the furrows (Cherop, 2019). Additionally, KVDA reduced size of cropped land during seasons when water availability was inadequate. This reduction in cropped land led to decreased food production, which in turn exacerbated food insecurity.

Key informant interviews revealed that Marakwet community opted to irrigate cassava over other crops (Cherwon, O.I., 2022). This preference stemmed from cassava's lower water requirements compared to other food crops, making it a strategic response to water scarcity. The cultivation of cassava enabled farmers to minimize risks of crop losses due to reduced water availability as a result of deterioration of furrows (Cherop, 2019). However, it is crucial to note that cassava crop was susceptible to mosaic disease (Kipkorir and Kareithi, 2012). These complicated farmers' efforts to maintain food security in Kerio Valley ecological zone.

In 1984, KVDA requested additional irrigation furrows from Marakwet community for use in mango and maize irrigation (Kipkorir and Kareithi, 2012). The community granted KVDA access to Kapsiren and Kabarmwar furrows (Davies et al., 2014). This was done under an agreement that KVDA would offer job opportunities and provide irrigation water to the community for irrigation when KVDA did not require it (Ruttoh, 1988). KVDA employed seven full-time and fifteen part-time workers from the Kapsiren clan on the basis of the agreement. The clansmen and women worked in Tot and Arror KVDA as field offices in Kerio Valley (Cherop, 2019). However, key informant interviews revealed that the community suffered food shortage since KVDA supplied water to the community only during wet season, when it was not needed for agricultural production (Murkomen, O.I., 2022; Kibowen, O.I., 2022).

Ecological change compromised effectiveness and efficiency of Marakwet furrows (Kipkorir and Kareithi, 2012). This forced KVDA to share irrigation water with the community due to insufficiency of water for crop irrigation in Kerio Valley. This resulted in rationing of water, a factor which contributed to withering of crops and conflict between farmers and KVDA, affecting food production. In the year 2000, both KVDA and Marakwet furrows were heavily

damaged by mudslides (Kipkorir and Kareithi, 2012). Key informant interviews observed that the community experienced the worst food shortage that year due to insufficiency of water for irrigation, necessitating the government to provide relief food to the population (Cheserek, O.I., 2022).

In the recent past, Marakwet traditional furrow system that enabled households to grow food crops for subsistence in the pre-colonial times has undergone considerable problems of decay and erosion. This degradation is attributed to population increase and climate change (Davies et al., 2014; Kipkorir and Kareithi, 2012). The flash floods, which are sometimes experienced in arid and semi-arid lands in Kenya, cause destruction of furrow infrastructure, hence disrupting livelihoods from farming (Ngaira, 2009). Marakwet furrows are threatened by landslides, which are prevalent along the escarpment due to increased cultivation and settlement on the Elgeyo Marakwet escarpment resulting from population pressure (Justine, O.I., 2022**)**. The functionality of the furrow system was severely crippled when landslides destroyed intakes and channel sections beyond the community's ability to repair. The deterioration of the furrows reduced food crop production and contributed to food insecurity in the area (Murkomen, O.I., 2022; Kibowen, O.I., 2022).

Deterioration of furrows, therefore, implies that the Marakwet community do not produce adequate food and are vulnerable to hunger because of inadequate harvests. Periods of food insufficiency were attributed to damage to furrows by short, abrupt, heavy rains, sharing of furrow water, and increased population. Ngaira (2009) aptly argued that in Kenya's ASAL areas, climate change has led to a reduction of river volumes. In Elgeyo Marakwet, prolonged drought periods due to changes in ecology have caused drying of rivers and streams, with permanent rivers such as Torok, Kerio, Perese, Kapkure, Etyo, Charar, and Tilio drying up or

becoming seasonal (Tuitoek, O.I., 2022). The cause of water inadequacy is seasonal fluctuation of river water levels, particularly during times of greatest need for irrigation water (Kipkorir and Kareithi, 2012).

In highland ecological zone, there is evidence of reduced water table, as many shallow wells in the area have dried up (GOK, 2014). Farmers are experiencing shortages of fodder and water for their livestock, which has reduced agro pastoral production. Consequently, community members have resorted to cattle rustling to compensate for their livestock losses, leading to increased insecurity. This insecurity has also impeded implementation of the 2007 government flagship projects in the area, identified in Vision 2030 in the year 2008, such as the expansion of Kerio Valley irrigation schemes under KVDA.

Apart from the KVDA, new irrigation schemes have been established in Elgeyo Marakwet. For instance, Tot-Kolowa irrigation system, established in 2013 on the border of Pokot and Marakwet, to foster peace by bringing together communities and encouraging them to share water resources in Kerio Valley as a common resource and embrace crop cultivation as an alternative economic activity (Cheserek, O.I., 2022). It is a 1000-acre irrigation scheme funded by the Canadian Red Cross (Davies *et al.,* 2014). The construction of the new irrigation channel was done north of the Embobut River (Davies et al., 2014; Davies and Moore, 2016). The scheme took water in a major pipeline across the floor of Kerio Valley, irrigating 500 acres in Marakwet (Davies and Moore, 2016). The scheme makes use of a fixed network of irrigation pipes and sprinklers.

The scheme aimed to reduce regional food security and develop cash cropping through the establishment of reliable irrigation infrastructure and distribution of hybrid seeds, inorganic

fertilizers, and pesticides (Davies and Moore, 2016). Despite the extensive documentation of Tot-Kolowa irrigation system development, Davies and Moore (2016) noted that while the irrigation project was implemented with honest intentions, it was based on the premise that local irrigation practices were inefficient and required modernization.

The system of fixing irrigation pipes and sprinklers contrasted sharply with the pre-colonial practices of shifting irrigation water between clans and shifting cultivation. Nonetheless, key informant interviews highlighted that Canadian Red Cross made a significant contribution by introducing this project in Kerio Valley, enabling people to cultivate their own food and produce sufficient food (Kipkore, O.I., 2022; Kirotich, O.I., 2022). However, the success of the scheme was short-lived as the pipes were vandalized and water source was blocked by cattle rustlers from Tiaty-Pokot, in March 2017 (Kibowen, O.I., 2022).

The County Government of Elgeyo Marakwet, in its Integrated Development Plan (CIDP) for the period 2013–2017, recognizing the potential of irrigation in achieving food security, identified various initiatives that include: doubling the area under irrigation schemes by 2017; designing irrigation projects to accommodate integrated farming activities such as fish farming and integrating irrigation activities into water-related project activities like electricity generation projects (GOK, 2013).

The County government of Elgeyo Marakwet, in partnership with KVDA and other organizations, intends to align their strategies to achieve food security (GOK, 2013). The CIDP states that food security will be achieved through expanding acreage under irrigation, engaging partners to promote irrigation schemes, rehabilitation and expansion of existing furrows, and promotion of individual and group irrigation activities to improve water

conveyance and increase land under irrigation (GOK, 2013). The increase in irrigated land is expected to bolster agro-pastoral economy and food security along the Kerio valley.

4.5 The Emergence of Cattle rustling and Elgeyo Marakwet Agro pastoral Economy

The fundamental function and responsibility of every state, among other things, is to safeguard lives and property of its citizens (Cherop, 2019). Policies, therefore, formulated by the state are supposed to be directed towards protection of citizens' lives and property (Shanguhyia, 2009; Unobe, 2014). Cattle rustling has been a major challenge to governance, national security, and economy of many nations across the world in the past and in recent times (Kisaka, 2009; Ali *et al.*, 2019).

Livestock production systems are largely a product of climatic and environmental factors (Waweru, 1992). Key ecological resources such as pasture, water, and natural vegetation are key drivers of livestock economy in Elgeyo Marakwet (Cheserek et al., 2012). Therefore, access to adequate pasture and water is essential for the sustainability of a pastoral livelihood and food production. In the pre-colonial era, Marakwet and their neighboring communities in Kerio Valley ecological zone shared ecological resources for livestock production. For example, Chesogon area and River Chesegon, located at the border of Marakwet and Pokot, were mutually utilized by the Marakwet and Pokot communities to graze and water their livestock for food production and food security through agro pastoral economy (Kirop, O.I., 2022).

River Chesegon, being a permanent river, was crucial to agro pastoral economy of Marakwet and Pokot communities, as it provided water for their livestock, irrigation, and thus ensured food production and food security. However, due to climate change, there was a reduction of

water levels and grazing points, which intensified competition over control of Chesegon area. This competition, was primarily driven by the need for water for cattle and irrigation purposes (Chebii, 2018). This sparked a dispute between Cheptulel Pokot and Endo Marakwet over water rights for agro-pastoral production from Chesogon River and its tributaries (Kisaka, 2009; Chebii, 2018). Consequently, this forced colonial government to establish an administrative boundary in Chesegon area, granting water rights of River Chesegon to the Marakwet, a decision reluctantly accepted by the Pokot (Kisaka, 2009). Despite this, long-standing conflict in Chesegon area, which had remained unresolved during the colonial period, reignited after 1963 (Cherop, 2019).

The District Commissioner of Elgeyo Marakwet District noted in 1964 Annual Report that conflict between Marakwet and Pokot still occurred at Chesegon area (KNA/DC/ELGM/2/9/1964). Marakwet were unwilling to permit Pokot to access water from River Chesegon for irrigation and watering their livestock (Kisaka, 2009). This move, however, triggered periodic conflicts characterized by incidents of cattle rustling, involving violent seizure of livestock using firearms, resulting in the destruction of property and loss of lives. This phenomenon still persists to date (Chebii, 2018). These conflicts have intensified cattle rustling and counter-cattle rustling activities in Kerio Valley ecological zone in the post-colonial era. It has also led to loss of human lives and caused significant damage to crops and property, disrupting ecological management practices, agro-pastoral economy and compromising food security.

The dispute over ownership of Chesegon area and Chesegon River has remained unresolved to date (Chebii, 2018). The dispute regarding the area worsened following independence (Kisaka, 2009; Kaprom, 2013; Chebii, 2018). Cases of cattle rustling have persisted

throughout the Kerio Valley, continuing patterns established in the pre-colonial and colonial periods (Kisaka, 2009; Kaprom, 2013; Cheserek *et. al.,* 2012; Chebii, 2018). In the recent past, Marakwet, being one of Kenya's agro-pastoral communities has been entangled in cattle rustling activities with their neighbors, Pokot. This is due to competition over limited access to sufficient water and pasture for their livestock, exacerbated by ecological changes that have reduced grazing land in Kerio Valley ecological zone (Cheserek et al., 2012; Chebii, 2018).

In the pre-colonial period, Pokot were traditional rivals of Marakwet, were they often engaged in cattle raiding activities primary as a means of acquiring livestock and restocking, especially after droughts or epidemics (Kipkorir and Welbourn, 2008; Kisaka, 2009; Chebii, 2018). These raids, which involved scaring away owners, were regularized by cultural customs (The National Council of Churches of Kenya, 2009). However, by late 1960s, a significant shift occurred, and cattle raiding in Elgeyo Marakwet no longer observed any of the traditional rules governing such activities. Raids, which were conducted primarily for gaining livestock, under the management of traditional elders of Marakwet and Pokot communities, lost their traditional regulatory framework.

It is important to note that during the pre-colonial and colonial periods, communities used raiding as a cultural practice for restocking herds, expanding grazing lands, and gaining access to water and pasture resources, particularly during or after periods of drought or disease outbreaks (Cherop, 2020). This cultural practice often entailed raiding of the best livestock or replacement of animals lost during adverse conditions (Cheserek *et. al.,* 2012; Chebii, 2018). Loss of human life was rare, and when this occurred, restitution in form of livestock was made to the victims or their families (Sigira, O.I., 2022). However, in the post-

colonial Marakwet, cattle raiding evolved from a traditional method of replenishing livestock using primitive weapons like bows, arrows, and spears, to a commercial activity involving firearms, thus becoming cattle rustling (Kaprom, 2013; Chebii, 2018).

Post-colonial cattle rustling exhibited a higher frequency, violence, and increased destructiveness compared to the pre-colonial and colonial eras due to introduction and use of guns (Cheserek *et. al.,* 2012; Murkomen, 2015; Chebii, 2018). Key informant interview submitted that:

> …this issue of cattle rustling by the Pokot is affecting us, they are using guns against us, we have lost human lives and livestock, we cannot concentrate on any meaningful activity such as cultivating our land or raise livestock for food production, the environment is not peaceful and we don't know the day, time and hour when we shall be attacked and raided by the Pokot, it's like cattle rustling activity by the Pokot has been politicized and commercialized, am so disappointed of the government of the day for not providing lasting solution to this problem, they just use the police to restore order only when the raiding has taken place and human lives lost…the government must invest in restoring peace between Marakwet and Pokot, we attribute these famines to incessant banditry attack by the Pokot, the community is starving not because of drought and famine, but because we cannot till our fertile land for fear of being attacked by bandits from Tiaty (Pokot in Baringo County) who are the cause of food shortage among our people…(Kirotich, O.I, 2022).

Similarly, Chebii (2018) observed that during *Boryop Sangutan* (Sangutan war) of 1967, when Pokot expanded their cattle rustling activities to Marakwet escarpment, Marakwet

launched a counterattack from riverbanks along deep Kerio Valley and massacred Pokot raiders with poisoned arrows. According to existing oral tradition, Marakwet held dominance due to their unparalleled arsenal of poisoned arrows, while Pokot, at that time, primarily relied on spears and arrows. As a result, Pokot were compelled to acquire guns from Karamojong in Uganda and South Sudan in order to counterbalance the lethal effectiveness of the Marakwet's poisoned arrows (Murkomen, 2015; Chebii, 2018).

The Elgeyo Marakwet District Annual Report of 1968 indicated that through use of guns resulted to loss of eight lives in northern division of the district due to cattle rustling, with several unspecified numbers of livestock being seized by the Pokot community (KNA/DC/ELGM/8/1968). To effectively address the problem of cattle rustling, the government established a General Service platoon station at Tot and dispatched Administration Police to the region (Chebii, 2018). According to annual reports, there were very few incidents of cattle raids in Marakwet Kerio Valley ecological zone between 1968 and 1975 (KNA, DC/ELGM/1976).

Key informant interviews stated that during this period of relative calmness, Marakwet people had the opportunity to focus on development of their agro pastoral economy (Kirop, O.I., 2022). However, this period was short-lived, as from 1975 onwards, the situation changed (Chebii, 2018). Cattle rustling became persistent, causing great disturbance to ecology and agro-pastoral activities, adversely impacting food security. The Elgeyo Marakwet District Annual Report of 1976 states that:

> …throughout the year, Kenya Police and Administration Police were occupied in northern area, which had been hard hit by Pokot raids. The deployment of General Service Unit in this area helped alleviate the situation. In addition to combating

> Pokot bandits, the security forces engaged in recovering of stolen livestock in the area and neighboring Districts. The establishment of General Service platoon and deployment of Administration Police effectively reduced the frequency of attacks (KNA, DC/ELGM/1976).

Cattle rustling activities persisted in various parts of Kerio Valley in Marakwet, notably at Tot and Chesongoch, despite presence of GSU officers and establishment of a GSU station (Chebii, 2018). In response, to remedy this problem, Kenyan government launched a disarmament initiative called "*operation toa bunduki*" in Kerio Valley region to address the insecurity (KNA/RVP/B/2/19/1979). This operation was conducted in October 1979, targeted Turkana, West Pokot, and areas along Baringo District, resulting in recovery of fifty homemade guns (KNA/RVP/B/2/19/1979). However, key informant interviews stated that cattle rustling continued in Marakwet Kerio Valley ecological zone throughout the 1980s and 1990s. This forced Marakwet to acquire guns for the defense of their livestock against Pokot raiders and for their own protection **(**Cherwon, O.I., 2022).

Interestingly, during a Focus Group Discussion (FGD) held with clan elders at Arror shopping centre in the year 2022, it emerged that the Marakwet obtained guns from the Pokot relatives (those who had migrated and settled in Pokot during the pre-colonial period, and those Marakwet married to the Pokot), and friends whom they met in Chesegon market.

In 1990s, widespread use of guns among Pokot and Marakwet communities in Kerio valley was facilitated by an illicit arms trade involving Sudanese People's Liberation Army (SPLA), pastoralist Karamonjong warriors from Uganda, and illegal traders in Kenyan (Kisaka, 2009; Murkomen, 2015; Cheserek, 2018; Chebii, 2018). Therefore, became commonplace tools in

cattle rustling activities between Pokot and Marakwet. Pokot sourced their guns from SPLA, trafficked through the Karamoja region in Uganda to Turkana and to West Pokot, and subsequently sold some to Marakwet people (Kisaka, 2009; Kaprom, 2013; Murkomen, 2015; Chebii, 2018).

Key informant interviews stated that cattle were traded for firearms at a rate of one gun per ten cows, significantly escalating cattle rustling (Kibowen, O.I., 2022). The proliferation of guns among both communities intensified cattle rustling activities in the 1990s, resulting in more frequent and deadlier clashes between Marakwet and their neighbors, Pokot (Chebii, 2018). This evolution indicates that cattle raiding transitioned from a cultural tradition to an organized criminal activity involving international networks. Cattle rustling has now become a lucrative criminal enterprise, contributing to increased incidences of violence in the region disrupting agro pastoral economy.

In mid-1990s, the entire Kerio Valley witnessed severe cattle rustling and counter rustling between Marakwet and Pokot (Cheserek et al., 2012; Kaprom, 2013; Chebii, 2018). With both sides armed with sophisticated weapons, cattle raiding degenerated into thuggery, murder, theft, and chaos (Chebii, 2018). The intensity of violence led to the area being nicknamed *"Kosovo"* due to frequent use of advanced weapons such as guns in these conflicts (Chebii, 2018). This moniker was derived from the armed conflict in Yugoslavia, which claimed many lives in the 1990s (Kathina, 2000; Chebii, 2018). The prime motive of cattle rustlers was to acquire livestock, often achieved through intimidation, killing, and property destruction (Cheserek et al., 2012; Kaprom, 2013; Chebii, 2018). These activities also led to significant ecological degradation, including destruction of water catchment areas,

crops, vegetation, and properties such as burning of granaries and houses **(**Sigira, O.I., 2022). This severely affected agro pastoral production systems and food security.

In 1992, people inhabiting Kerio Valley ecological zone in Elgeyo Marakwet moved and settled in escarpment ecological zone, an area considered safer from raiders who had taken over the entire Marakwet Kerio Valley ecological zone (Kirotich, O.I., 2022). In the escarpment, they could better monitor and defend against bandits from East Baringo, who frequently targeted Marakwet areas such as Arror, Endo, Chesetan, Tot, Chesuman, and the larger Kerio Valley ecological zone (Cheserek, O.I., 2022). This migration and settlement placed considerable pressure on the escarpment ecological zone, causing ecosystem degradation through over cultivation and overgrazing (Chebii, 2018). Thus, cattle rustling conflicts have had significant damage to ecosystem in Elgeyo Marakwet. The escarpment, which served as a crucial water catchment area for many rivers and streams flowing into Kerio Valley and provided essential irrigation water and livelihood for people living in fertile Kerio Valley ecological zone, came under serious threat due to cattle rustling activities. These activities transformed escarpment's ecology, adversely affecting agro pastoral production systems such as pre-colonial shifting irrigation and cultivation, thus comprising food security.

In addition to deploying police as policy action to curb cattle rustling menace, government also recruited and armed Kenya Police Reservists in mid 1990s to complement security providers (Murkomen, 2015; Chebii, 2018). This initiative, aimed at enhancing security in ASALs. However, it was marred with allegations of political interference in recruitment process, with politicians reportedly ensuring that their clan or community members outnumber those of their rivals (Murkomen, 2015; Chebii, 2018). The government's efforts to effectively manage this situation, was hindered by the fact that some raiders, crossing

national borders, find refuge in neighboring countries (Oba, 1992; Shanguhyia, 2008; Kaprom, 2013).

It can be noted therefore, that this inadvertently contributed to perpetuation of cattle rustling among pastoralist communities. This indicates that acts of cattle rustling are politically connected in their causation and persistence, and the state has been consistently ineffective in addressing and curtailing it in Marakwet. The weakening of government control over the pastoralist region has resulted in the emergence of cattle bandits who run armed militias to protect their interests (Chemisto, 2004; Cheserek et al., 2012; Kaprom, 2013; Chebii, 2018). This indicates that the government of Kenya lack a clear policy on effectively curtailing cattle rustling.

In 1994, KVDA, which had been concentrating on agricultural programs in Kerio Valley ecological zone, covering Tot and Arror in Marakwet and Cheptebo in Keiyo areas, by helping farmers in the production of maize, citrus fruits, sorghum, cassava, and green grams, decreased its activities in Kerio Valley part of Marakwet due to increased insecurity (Marakwet District Development Plan, 1994). Camel project introduced in Koitilial also collapsed as camels became targets for raiders (Chebii, 2018). Notably, in 2001, cattle rustling was often accompanied by destruction and burning of houses and food stores (Cherop, 2019). This was contrary to the pre-colonial period when cattle raiding was not typically associated with property destruction beyond forceful acquisition of livestock and maiming, or killing of individuals who obstructed the raiders (Cheserek *et al.*, 2012; Kaprom, 2013; Chebii, 2018).

Similarly, Kenya Human Rights Commission (2002) in its fact-finding mission in Marakwet and Pokot in the year 2002, noted that cattle rustlers often collaborate with some government security agents to facilitate livestock theft. This collaboration increase tension among the different communities, negatively affecting their agro pastoral economy and food security (Chebii, 2018). Fixing cattle rustling problem has been challenging due to scarcity of security personnel, poor infrastructure and insufficient police posts in northwest Kenya (Kisaka, 2009).

The Kenyan government appears to have adopted a punitive approach similar to that of the colonial government regarding cattle-rustling between Marakwet and Pokot (Chebii, 2018). This approach has heightened tensions and animosity between security agents and members of the communities involved, hindering effective collaboration in efforts aimed at curbing livestock theft (Weiss, 2004). Additionally, disarming members of the Pokot and Marakwet communities, who often hide in the hilly areas, has proven difficult (Kirotich, O.I., 2022).

Insecurity resulting from cattle rustling has been a critical challenge in Marakwet, consistently undermining government economic development projects, including agro-pastoral production and food security activities. As farmers are forced to flee from their homes and are unable to tend to their farms. This insecurity has led to the abandonment of various development projects in Elgeyo Marakwet. For instance, livestock upgrading center in Kapkondot, in Kerio Valley Marakwet, established in 1990s, was abandoned due to incessant cattle raids (Chebii, 2018).

Additionally, a significant proportion of agro pastoral households in Marakwet District abandoned their farms after raids intensified, resulting in empty granaries and limited

purchasing capacities after losing their livestock to raids (Kaprom, 2013; Chebii, 2018). Consequently, food production and food security in Elgeyo Marakwet have been severely compromised due to cattle rustling driven by competition for scarce ecological resources. Notably, between 1991 and 1995, there was a significant drop in production of cassava and sorghum in Marakwet (Chebii, 2018). The decline in the production of millet and cassava was attributed to insecurity arising from cattle rustling activities. This insecurity created an unfavorable environment for agro pastoral. Key informants opined that Kerio valley area of Elgeyo Marakwet is known for its cassava and sorghum production due to its favorable warm conditions (Sigira, O.I., 2022). Reduction in cassava and sorghum production caused food shortage and consequent food insecurity.

In the same vein, cattle rustling has contributed to decline of agro-pastoral related trading activities (Chebii 2018; Cherop, 2020). Key informant interviews stated that, in the pre-colonial period, people of Elgeyo Marakwet living in Kerio Valley ecological zone were known for barter trade with their neighbors (Kibowen, O.I., 2022). With a peaceful environment, formal trade flourished, and numerous trading centers became known for the exchange of grains, livestock, and livestock products (Kipkorir, 1973; Chebii, 2018). However, trade, which had thrived from the pre-colonial period through the post-colonial period, declined due to insecurity caused by cattle rustling. Some of the most important livestock markets in Marakwet District were closed as a security measure when cattle rustling between the Marakwet and Pokot intensified (Mohamud and Pkalya, 2005; Chebii, 2018). Thus, trade ties that arose out of ecological and complementary needs of closely situated communities in the pre-colonial period were destroyed by cattle rustling, resulting to food insecurity.

Cattle rustling has also significantly hindered development and provision of essential services in pastoralists' areas through disruption of communities' livelihood systems by restricting economic development (Kaprom, 2013; Chebii, 2018). In Kerio Valley ecological zone of Marakwet, cattle rustling has severely impeded implementation of government development projects in irrigation and livestock (GOK, 2002). For example, in the year1990s, KVDA, which had been assisting farmers in Kerio valley with production of maize, citrus fruits, sorghum, cassava, and green grams reduced its activities in the year 2000 due to insecurity (GOK, 1994; Chebii, 2018). It is worth noting that cattle rustling in Kerio Valley has stopped many development projects introduced in the area by the government and NGO's, including those projects focused on food production. Given that meaningful development projects cannot thrive in an insecure environment, conflict arising from cattle rustling has also acted as a disincentive to investment by communities and development agencies such as NGOs.

Insecurity prevalent in the Kerio Valley ecological zone seriously curtailed implementation of development projects in irrigation and livestock (Marakwet District Development Plan, 2002). In the year 2002, several multi-million projects such as Chepkum and Loyapat irrigation schemes in Tot funded by KVDA, were suspended following frequent attacks from the Pokot community (Chebii, 2018). These schemes had previously been productive in cultivating maize, millet, green grams and watermelons, significantly alleviating food security (Cheserek, O.I., 2022). Furthermore, due to constant cattle rustling activities in Kerio Valley, there was a notable fall in government and NGO-funded development projects.

In the year 2013, Kenya Red Cross established and funded a 100-acre Tot-Kolowa Irrigation Scheme. The scheme was funded to the tune of Sh245 million by the Canadian Red Cross with the aim of cultivating crops such as watermelons, vegetables, millet, maize, and

sorghum for subsistence and commercial purposes in (Tot) Marakwet and (Kolowa) Pokot regions. This irrigation initiative was intended to facilitate peace-building by fostering cooperation among communities in Kerio Valley ecological zone through shared access to water resource (Krop, O.I., 2022).

At initial stages, Tot-Kolowa irrigation scheme was vibrant; it significantly improved security in the area through production of several crops such as sorghum, millet, maize, watermelon, mangoes and beans, and retrogressive practices such as cattle rustling had been reduced. This increased agro-pastoral production and food security (Krop, O.I., 2022; Kirotich, O.I., 2022). However, this positive trajectory was short-lived as persistent cattle rustling forced the abandonment of 100-acre Tot-Kolowa Irrigation Scheme in March 2017 in Kerio valley, Marakwet (Kirotich, O.I., 2022).

The irrigation scheme fell victim to frequent raids by Pokot cattle rustlers, who also vandalized irrigation pipes (Krop, O.I., 2022). Thus, it is evident that cattle rustling has undermined agricultural development initiatives aimed at enhancing food production and food security for the people of Elgeyo Marakwet. A farmer who had benefited from the scheme submitted that:

> …life has become hard for us, we were happy when the irrigation scheme was established in 2013 in our area by the Red Cross, but now we do not get food since our farmlands have been turned into cattle rustling battlefield, the scheme had benefited 1000 people in our area and irrigated 500 acres of land, the scheme, however, was abandoned after destruction of crops and blocking of water to our land under irrigation by the Pokot from Tiaty, Baringo County living upstream, this has contributed to food shortages in this area (Kirotich, O.I, 2022).

Following abandonment of Tot-Koloa Irrigation Scheme, Marakwet community has increasingly left their farms due to pervasive menace of cattle rustling and banditry, leading to decreased agro-pastoral production and food insecurity (MoALF, 2017). Thus, cattle rustling has not only exacerbated insecurity for livestock and human population but also exacerbated overall food insecurity in Marakwet over the years.

In addition to cattle rustling, key informant interviews noted that in Kerio Valley ecological zone, in recent times, they have experienced increased wind and temperature intensity that have resulted in increased incidences of animal diseases (Kipruto, O.I., 2022; Kalkal, O.I., 2022; Barar, O.I., 2022). This observation is supported by a report from the Ministry of Agriculture, Livestock, and Fisheries indicating that diseases such as bacterial wilt, Rift Valley fever, potato cyst nematode, ovine rinderpest, blight, and red mites, which were only associated with highland ecological zone in the pre-colonial period, are currently experienced in Kerio Valley ecological zone (MoALF, 2017). These trends indicate significant ecological change in the region.

Therefore, based on the discussions, it is evident that Kenyan government has attempted to disarm Pokot and Marakwet communities, deploy police, recruit and arm Kenya Police Reservists through various policy actions. Despite these efforts, cattle rustling continues to pose a significant threat in Marakwet. Devastation from cattle rustling in Kerio Valley, together with recent severe droughts in the area, has fostered new outbursts of cattle rustling. With use of sophisticated weapons, a family can lose its entire herd of animals in a single day, leaving them without livestock, jeopardizing their survival. Thus, under these conditions, pre-colonial ecological management practices, pastoral livelihood strategy for food production and food security, has become unsustainable. In addition, there is limited information on the

socio-economic impact of cattle rustling on ecology and agro-pastoral systems, leading to inadequate government policy and legislation support for pastoral production systems.

The County Government of Elgeyo Marakwet, in its Integrated Development Plan (CIDP) for the period 2013–2017, outlined several key focus areas on cattle rustling and security along Kerio valley during the CIDP period (GOK, 2013). It proposed several initiatives to enhance security and peacebuilding in the county. These initiatives include establishing a County Policing Authority to be chaired by the governor, with membership comprising community representatives and national government security officers, designing collaborative networks with national security agents to combat insecurity through County Policing Authority; identifying areas with significant security needy and mobilizing resources; liaising with the national government on voluntary disarmament programs to collect illegal firearms; allocate resources to support national security initiatives, implementing mechanisms to provide offices and residential units for security officers, and finally, establishing a Peace Secretariat to manage and sustain peace building dialogues and activities within the Plan period (GOK, 2013).

4.6 Agro-Pastoral Production in Post-colonial Period

The independent Kenyan administration inherited a country with spatially uneven development, where most policies had favored white settler community (Shanguhyia, 2008; Kisaka, 2009). The new administration committed to implementing policies that would benefit the African community (Bernard, 1985; Shanguhyia, 2008). To promote agricultural growth, government formulated a policy in 1965 called Sessional Paper No. 10 of 1965 entitled *African Socialism and its Application to Planning in Kenya* (Omwoyo, 1990). This policy outlined government's development strategies, including agricultural development,

with economic growth serving as the foundation for development policies (Omiti and Irungu, 2002; Kisaka, 2009).

Despite high hopes held by many Kenyans, the independent government perpetuated institutional and spatial biases inherited from the colonial era (Bernard, 1985; GOK, 2021). The focus remained on economic growth and capital investment, which was directed towards areas perceived to have rapid development potential. Infrastructure, agricultural innovations, capital and industrial investments were concentrated in areas of high and medium potential (Ochieng, 1995; Kisaka, 2009; Cherop, 2019). Consequently, agricultural development, especially in crop production within small farm sector, saw significant growth (Omiti and Irungu, 2002; Kisaka, 2009; Wasike, 2018). Kenyan government emphasized importance of enhancing agricultural production to satisfy both domestic consumptions needs and export demands (KNA/DC/ELGM/1963).

In Elgeyo Marakwet, efforts on part of the government to promote crop development and agriculture were concentrated in highland ecological zone. In its effort to enhance national food security, Kenyan government invested in production of high yielding hybrid seeds, particularly hybrid maize seeds, as part of its broader socio-economic development. To achieve this, government established a breeding station for hybrid maize in Kitale, with intention of increasing maize yields for both cash and food crop production (Kisaka, 2009). However, Kitale Research Station mainly focused on developing varieties suitable for highland areas.

Breeding of hybrid maize was carried out in state-run research stations funded by the Kenyan government and external donors including NGO’s (Kisaka, 2009). Promotion of these hybrids among Kenyan farmers was facilitated by field extension staff under the Ministry of

Agriculture. The main objective of this government-led crop innovation was to produce high-yielding hybrid varieties suitable for different ecological zones in Kenya, from high potential to semi-arid areas, to enhance food security and commodity production across the country.

From the year 1963 onwards, the government attempted to expand agricultural production in Elgeyo Marakwet by promoting high-yielding new crops and a variety of cash crops such as coffee and tea (KNA/DC/ELGM/2/1/1964). To facilitate this, government encouraged farmers to form cooperatives for marketing their agricultural produce. Introduction of new crops, particularly hybrid maize and new seed varieties for different crops played a significant role in this effort. Agricultural production in Elgeyo Marakwet was stimulated by changes in land tenure, adoption of high-yielding crop varieties, and establishment of hybrid maize demonstration plots (Kipkemei, 2020). With land demarcation in highland ecological zone, district agricultural officers actively promoted agricultural development and expansion in this area (Chebet and Dietz, 2000).

In 1964 hybrid maize seed (*Chepkikchat*) was first introduced in Elgeyo Marakwet District, replacing colonial maize prevalent at independence (KNA/DC/ELGM/2/1/1964). In 1963, "colonial" crops occupied 64 percent of total district acreage, with local maize (*chebolosiot*) accounting for 42 percent and other crops 22 percent (KNA/DC/ELGM/2/1/1964). The introduction of hybrid maize seed was readily accepted by many large-scale farmers, especially in highland ecological zone (KNA/DC/ELGM/2/1/1964). Key informant interviews submitted that, most farmers adopted hybrid maize cultivation independently, while others received partial assistance from government through credit schemes (Joseph Sawe, O.I., 4/7/2022). However, Kerio Valley ecological zone was neglected in the development of hybrid seeds. This is evidenced by the fact that in 1967, out of 32

government-employed agricultural extension workers in Elgeyo Marakwet, only two were assigned to Kerio Valley ecological zone (KNA/DC/ELGM/1967). As a consequence, there was massive movement of people to highland ecological zone (Tarus, 1994; Chebet and Dietz, 2000).

The Elgeyo Marakwet annual report of 1967 indicates that climbing the cliff (moving to highland ecological zone) became a major livelihood strategy (KNA/DC/ELGM/1967). Able-bodied young men from *Maina* and *Chumo* age-sets crossed the escarpment ecological zone to open up the thick forest for agro pastoral activities, including cultivation of hybrid maize seeds (Chebet and Dietz, 2000). Key informant interviews stated that 'new' land on the highland ecological zone beyond the cliff was referred to as ten'gunin or *shamba* (which loosely translates to mean open space). Motivation for climbing the cliff was driven by introduction and cultivation of hybrid maize seeds in highland ecological zone (Arap Msafiri, O.I., 2022). Hybrid maize achieved remarkable success in Elgeyo Marakwet highlands, occupying 67 percent of the district's crop land (KNA/DC/ELGM/1968).

In 1968, some farmers in Elgeyo Marakwet district were reluctant to cultivate hybrid maize seeds (KNA/DC/ELGM/2/9/1972). The maize variety was considered hard to grind using *tin'get* or *kiroroko* or *chepn'goisio* (hand milling machine for milling grains) compared to *Chebolosio* (local maize) (Tarus, 1994). Furthermore, farmers opined that they preferred local maize seeds because they could be retained from previous harvests and replanted in the next planting season. *Chebolosiot* could also be planted without certified fertilizers or agro-chemicals and still yield a good harvest with sufficient rainfall (Chepkon'ga, O.I., 2022). This made hybrid maize cultivation more expensive.

However, in 1970, the problems with hybrid maize were partially solved when field extension officers encouraged farmers to obtain government loans for purchasing hybrid seeds and fertilizers to boost production (Tarus, 1994). These loans were made available to farmers through farmers' co-operative societies and state-run Agricultural Finance Corporation (AFC), among other financial institutions (KNA/DC/ELGM/2/9/1972). Additionally, posho mills were introduced, this facilitated acceptance of hybrid maize among farmers due to its high yield and performance compared to millet and sorghum (KNA/DC/ELGM/2/9/1972). This development led to increased food production and food security.

From 1972, hybrid maize production in Elgeyo Marakwet increased rapidly due to expanded maize acreage and a well-organized distribution of seeds and fertilizers by the ministry of agriculture (Chebet and Dietz, 2000). Hybrid maize also spread rapidly among farmers in the area not only because of its high yield but also due to its ease of weeding and harvesting as compared to sorghum and finger millet (Tarus, 1994). Key informant interviews indicated that production also increased due to availability of ready markets in Kerio Valley ecological zone and neighboring districts like Baringo. In highland ecological zone, large pasture and forest areas were converted into crop land (KNA/DC/ELGM/1972). Traditional ecological management practices such as fallowing, which maintained soil moisture and fertility for crop production, had almost disappeared in most areas in Elgeyo Marakwet by mid-1970s (Massan, 1968). This shift eroded region's ecological knowledge on soil management and conservation, adversely affecting food production and food security.

With the adoption of hybrid maize in Kerio Valley ecological zone, cultivation of finger millet and sorghum decreased by more than half acreage between 1970 and 1972, while acreage of local maize also decreased rapidly (KNA/DC/ELGM/2/9/1972). This shift

contributed to food shortages in Kerio Valley. Key informant interviews submitted that many men who had remained in Kerio Valley ecological zone began establishing families in both highland and Kerio Valley ecological zones. In some cases, men had one wife with some plots in the valley and another wife or wives with a plot or plots in highlands in order to realize food security (Komen, O.I., 2022). It is important to point out that, crop production changes observed in Elgeyo Marakwet between 1963 and 1972 mainly involved a shift in both location and crop type, from sorghum and finger millet in Kerio valley to maize in highland ecological zone (KNA/DC/ELGM/2/9/1972).

Crop production in Kerio Valley ecological zone dropped from 41 percent of district acreage in 1963 to 9 percent in 1972 (KNA/DC/ELGM/2/9/1972). Hybrid maize fields were predominantly situated in highland ecological zone compared to Kerio valley (Ruto, O. I., 2022). However, Elgeyo Marakwet Annual Report of 1982, indicated a significant increase in hybrid maize production in both highland and in Kerio Valley ecological zones between 1972 and 1979. The area under cultivation and yield increased from an estimated 1,000 to 1,400 Kgs per hectare in 1972 and 2,500 – 2,800 Kgs per hectare in 1979 (KNA/DC/ELGM/1982). This increase in production was attributed to intercropping of maize with beans (KNA/DC/ELGM/1982). However, in 1980–1981, there was a wide-spread food crisis in Kenya (Shanguhyia, 2008). This prompted government to design its first national food policy in 1981 (Shanguhyia, 2008).

This national food policy was necessitated by severe post-independence food crisis of 1980, which forced government to import large quantities of grains to mitigate the crisis (Shanguhyia, 2008). The policy also recognized importance of promoting drought-tolerant food crops such as millet and sorghum in ASALs, including Elgeyo Marakwet, to enhance

food security. During this period, value attached to traditional crops such as sorghum and finger millet, which ensured food security in the pre-colonial period, declined significantly. In Elgeyo Marakwet, cultivation of these crops decreased from an estimated 2,800 hectares in 1979 and 2,500 hectares in 1982 (KNA/DC/ELGM/1982). In some parts of highland ecological zone, finger millet was produced primarily for brewing local beer (KNA/DC/ELGM/1982). Thus, in relative terms, it can be argued that sorghum and finger millet occupied less than 10 percent of the district's agricultural land.

Apart from hybrid maize, government introduced various cash crops in Elgeyo Marakwet, including Coffee and Tea in 1964, sunflower in 1971, Cotton in 1973, Nippier grass, and Lucerne in 1977 (Chebet and Dietz, 2000). Coffee cultivation reached its peak in 1967, covering an area of 60 hectares, but subsequently disappeared following a major failure (Chebet and Dietz, 2000). Cotton was introduced by government as part of a strategy to attract investors and transform Kerio Valley ecological zone into a cotton belt, as it was considered a promising cash crop in the region (KNA/DC/ELGM/1982). However, farmers in Kerio Valley ecological zone grew disillusioned with the management of Cotton Lint and Seed Marketing Board leading them to reconsider their commitment to cotton production (KNA/DC/ELGM/1982).

Tea was mainly grown in Keiyo South constituency and Marakwet West constituency, both under Nyayo Tea Zone, as a cash crop. However, its yield was poor, and there were no organized tea picking centres. Harvested tea had to be sent to factories in Nandi Hills for processing. The long distance discouraged farmers from expanding tea cultivation (Chan'gach, 2015). Thus, tea cultivation in highland ecological zone did not have any significant economic impact. Similarly, sunflower was never regarded as viable alternative

cash crop and remained relatively marginal (Kipkemei, 2020). These crops had minimal impact, occupying only 2 percent of the district acreage between 1979 and 1982 (KNA/DC/ELGM/1982). Therefore, it can be observed that, of the new crops introduced after independence, only hybrid maize achieved overwhelming success.

From 1982 onwards, maize tends to have become staple crop of the people of Elgeyo Marakwet in the three ecological zones (Chang'ach, 2011). It was cultivated throughout the region, serving both as a cash and a food crop (Chan'gach, 2015). The community cultivated less millet and sorghum compared to maize (Arap Msafiri, O.I, 2022). This change was attributed to the greater labour requirement and tedious nature of cultivating millet and sorghum. Additionally, maize served dual purpose of being both a commercial as well as a subsistence crop (Chang'ach, 2011). People have had also acquired a definite taste preference for *posho* (maize meal) over millet and sorghum (Tarus,1994). Despite maize being the main food crop in the three ecological zones, it was not necessarily best suited to ecological conditions prevailing in these areas (Kipkorir & Ssenyonga, 1985).

Indigenous grains, such as millet and sorghum, are more drought-resistant and can be safer alternatives; however, most people today plant maize as their primary food crop (Cherop, 2019). Consequently, hybrid maize has displaced traditional cereals of Elgeyo Marakwet, such as finger millet and sorghum. In Africa, maize has supplanted traditional cereals for several reasons; one major reason maize's popularity is that it requires less labour during weeding, harvesting, and processing than other grains such as finger millet and sorghum (Acland, 1986). Thus, maize is considered a labor-saving crop compared to indigenous grains (Schneider, 1981).

In 1990s, the people of Elgeyo Marakwet predominantly engaged in monoculture, particularly focusing in maize production (Chang'ach, 2018). This practice led to soil degradation, exposing the soils to agents of erosion such as wind and rainwater run-off, contributing to widespread land degradation that threatens ecological management and food security. In addition, County's maize production potential of 25 tons per hectare has not been realized. This shortfall was attributed to ecological changes, high cost of farm inputs like fertilizers that farmers cannot afford and poor farm management (GOK 1991). Maize cultivation has almost replaced finger millet and sorghum in highland ecological zone (Chan'gach, 2018). Notably, finger millet and sorghum are still grown in Kerio Valley ecological zone, however, area's potential has not been fully realized due to scarcity of certified seeds, moisture stress, and damage from birds (GOK, 1991; Chan'gach, 2018). These factors have contributed to food insecurity in the region.

In mid-1990s, the people of Elgeyo Marakwet began cultivate Irish potatoes (Chang'ach, 2018). This crop was mainly grown in highland ecological zone of Keiyo North, Keiyo South, Marakwet East and Marakwet West Constituencies in Elgeyo Marakwet County (GOK, 2013). Irish potatoes are popular in these areas due to the fact that it matures faster than other available crops, require little labour and have high yields (MoALF, 2017). However, two critical ecological hazards associated with Irish potato production are intense rains and moisture stress.

The Ministry of Agriculture, Livestock and Fisheries reported that intense rains negatively affect Irish potato production in areas around Kipkabus, Kaptagat, Kaptarakwa, Chepkorio, and Nyaru in Keiyo South, as well as larger parts of Marakwet West, including Lelan, Kapyego, and Sengwer in Marakwet East. These areas are particularly susceptible to heavy

rains, while areas that include Kamariny and Kapchemutwa in Keiyo North are more prone to moisture stress (MoALF, 2017). Intense rains foster conditions suitable to bacterial wilt and blight, resulting in reduced yields (MoALF, 2017). This has led to a decrease in cultivation of grain food crops, adversely interfering with food production and food security.

Based on the discussions, it can be observed that in the process of government attempting to introduce new crops such as tea, coffee, sunflower, maize, and cotton through various policies and legislations, disrupted cultivation of traditional food crops such as local maize, millet, and sorghum. Consequently, majority of Elgeyo Marakwet population have abandoned the cultivation of millet and sorghum, their traditional staples, in favour of new crops, especially maize, which serves as both food and cash crop. However, maize production has been held back by ecological changes which have impeded the region from realizing its full maize production potential. Additionally, monoculture of maize has also caused soil degradation, that has exposed soils to agents of erosion and contributing to widespread land degradation. This, in turn, has distorted ecological management practices, reduced agro-pastoral production and threatened food security.

The County Government of Elgeyo Marakwet, in its Integrated Development Plan (CIDP) for the period 2013–2017, outlined several key focus areas on agricultural production during the CIDP period (GOK, 2013). These priorities encompassed development of cash crops, adoption of productivity-enhancing technologies, implementation of strategies for irrigated farming in the Kerio valley, enhancement of fruits and vegetables cultivation, promotion and support for fish farming, initiatives to enhance livestock production, efforts in value addition and marketing, and chain linkages (GOK, 2013). These initiatives are aimed at fostering increased food production and food security within the County.

4.7 *Shamba System* Agriculture

Shamba system agriculture is a method of tree plantation management in which farmers are permitted to cultivate crops on government or private forest land for a period of up to three years after harvesting of commercial timber plantations (Limo, 2016; King, 2008; Kagombe & Gitonga, 2008). *Shamba system*, known as *taungya* in Burma (now Myanmar), was introduced by British colonial foresters in the 19th century (Watson, 2003). The system was first implemented in Burma around 1856 by Dietrich Brandis, a German forester who became the Inspector General of Forests in India. Brandis introduced the *taungya* system as a method of reforestation (von Hesmer, 1966), where local farmers were allowed to cultivate crops in forest reserves for a few years while also planting and tending young trees. This practice helped regenerate forests while also providing temporary agricultural land for the farmers. The *taungya* system later influenced similar practices in other British colonies, including the shamba system in Kenya (Oyugu, 2022).

In the colonial period, *Shamba System* agriculture was first introduced in Kenya by colonial administration in 1910 as a modified form of *Taungya* System (Watson, 2003). It was aimed to provide raw materials for burgeoning timber industry and to reduce pressure on natural forests (Oduol, 1986). The system involved converting natural forest land into exotic forest plantations (Wanyiri et al., 2001). It was introduced in Elgeyo Marakwet in 1941 and was retained after independence (Limo, 2016).

In the post-colonial Elgeyo Marakwet, *Shamba System* policy was introduced in 1970s (Limo, 2016). Government cleared designated forest land in government forests in Kipkabus, Kapchemutwa, Kaptagat, Kessup, Sabor, Benon, Kapcherop, Cheptonge and Tirop forests to grow food crops (Chebii, O.I., 2022). Farmers cultivated maize, beans, and potatoes on these

clear-cut forest land as they replanted trees (Kenneth, O.I., 2022). These forest cultivators were integrated into Forest Department as resident workers (Kagombe& Gitonga, 2008). They were allocated Shamba (land) to cultivate and guaranteed work for nine months per year (Oyugu, 2022). In addition to the shamba, agricultural produce from shamba was considered part of workers´ emolument (Gachanga and Chege, 2000).

In 1975, resident workers were permanently employed by Forest Department (Kagombe& Gitonga, 2008; Limo, 2016). These workers were required to lease shambas from Forest Department (Kagombe & Gitonga, 2008). Key informant interviews indicated that in 1975, new people from outside (Kikuyu community), came to Kapchemutwa, Kapcherop, and Kaptagat government forest lands in Elgeyo Marakwet to lease shamba for cultivation (Chebii, O.I., 2022). This influx of people from outside significantly increased number of shamba system cultivators leading to poorly tended shamba and low survival rates of planted trees (Limo, 2016). This subsequently interfered with food production. Due to poor tending of the planted trees, the system was banned by a presidential decree in 1987 (Kangombe, 1997; Kagombe & Gitonga, 2008).

In 1988, all forest workers residing in forests and other people living in forest villages were evicted from forest areas in Kenya, including Elgeyo Marakwet (Kagombe& Gitonga, 2008; Limo, 2016). In the same vein, in 1994, government initiated a retrenchment program, resulting in termination of some forest workers. This led to acute shortage of labour for forest management through shamba system (Kagombe& Gitonga, 2008). Oral interview with a retrenched forest worker revealed that there was low survival of planted seedlings at Kapchemutwa and Kaptagat government forest land due to lack of maintenance. This also negatively affected food production among residents of Elgeyo Marakwet, who had

cultivated plots in the forest, as their crops were destroyed, contributing to food insecurity (Chepkon'ga, O. I., 2022). Kagombe & Gitonga (2008) noted that in Kenya, less than 20% of clear-felled areas were replanted, and 80% of the replanted areas were not weeded.

In 1994, government reorganized and reintroduced *shamba system* in a few districts, including Keiyo District and Marakwet District in Elgeyo Marakwet, as Non-Resident Cultivation. Under this new system, farmers were not allowed to reside in the forest areas (Kagombe& Gitonga, 2008). Management of Non-Resident Cultivation system was transferred from Forest Department to District Development Committees (DDC) to integrate the system into the District Focus for Rural Development (Wanyiri et al., 2001). By 1997, Non-Resident Cultivation had started in all major forest plantation districts in the Country, including in Elgeyo Marakwet (Kagombe& Gitonga, 2008). However, key informant interviews revealed that this change gave local politicians a leading role in allocating shambas, which resulted to disregard of advice from the technical departments on shamba system development (Chebii, O.I., 2020).

By 1999, extensive and unsuitable areas of Kapchemutwa and Kaptagat government forest land had been opened for cultivation without significant replanting of trees (Chelal, O.I., 2022). Therefore, it can be argued that implementation of Non-Resident Cultivation failed to adequately address environmental management issues, contributing to ecological disruption and negatively affecting food production and food security. Key informant interviews opined that involvement of politicians led to corruption in plots allocation, as they allocated suitable areas of government forest land and large plots to members of their clan, friends, supporters, and relatives (Chepkon'ga, O.I., 2022).

In this situation, harvested areas in some places were not replanted, and those that had planted trees such as Kaptagat and Kapchemutwa government forest land, were destroyed to make way for crop cultivation. This was further exacerbated by termination of World Bank-funded Kenya Forestry Development projects in 1998. This greatly affected replanting and food crop production program. Additionally, government of Kenya reduced funds allocated to Forest Department for seedling production, planting, weeding, and general maintenance from Ksh. 390 million in 1996 to Ksh. 25 million in 2000 (Kagombe& Gitonga, 2008). This disruption, interfered with forest ecological system, adversely affecting future food production and food security.

In the year 2000, Forest Department headquarters found it necessary to step in and issue management guidelines on Non-resident Cultivation. An inter-institutional task force, comprising officers from Forest Department, Kenya Forestry Research Institute (KEFRI), Kenya Wildlife Service (KWS), and Nyayo Tea Zones and Conservation Corporation, was formed to review implementation of Non-Resident Cultivation (Wanyiri et al., 2001; Kagombe& Gitonga, 2008; Limo, 2016). The task force report introduced cultivation guidelines that emphasized proper management of cultivated areas, involvement of cultivators in reforestation, and closure of areas that could not be replanted immediately (Kagombe& Gitonga, 2008; Limo, 2016). These efforts yielded positive results in 2003 from some forest stations, especially in Central, Eastern, and Rift Valley province.

In Kenya, there was an increase in annual planting of trees from 3000 in the year 2000 to 8000 hectares in the year 2003 (Kagombe& Gitonga, 2008). Significant progress was also reported in Kaptagat forest and other forest lands under shamba system in Elgeyo Marakwet (Limo, 2016). However, this positive trend was short-lived, Ministry of Environment and

Natural Resources banned Non-Resident Cultivation again in October 2003 (Limo, 2016). The ministry noted that shamba system had become laden in corruption, with corrupt Kenya Forest Service officials (Foresters) allocating substantial portions of forest land to themselves, often with little attention to planting or tending of tree seedlings and allowing destruction of planted trees (Kagombe& Gitonga, 2008). As a result of the ban, participating farmers in shamba system arrangement in Elgeyo Marakwet were instructed to remove their crops from the forest areas by mid-2004 (Kemboi, O.I., 2022). However, some farmers were hesitant to move out and continued with cultivation, leading to conflicts with Kenya Forest Service officials.

In the year 2005, government enacted Forest Act, which established provisions for the conservation and management of both public and private forests, including areas requiring special protection (Agevi, 2016). The act delineated various management regimes for forest conservation, including traditional community forest management (Agevi, 2016). This act also introduced Plantation Establishment and Livelihood Scheme (PELIS), managed by the Kenya Forest Service (formerly the Forest Department) to help increase forest cover and restore degraded forest in the country (Agevi, 2016). Under this scheme, Forest Adjacent Communities (FAC) benefit by forming Community Forest Associations (CFAs), which are allocated plots for planting seedlings and managing them until the area forms a closed canopy while at the same time engage in crop cultivation on the forest land.

Through the Forest Act of 2005, Elgeyo Marakwet people, for instance, those residing near Kapchemutwa Forest, formed Community Forest Associations (CFAs) called Kapchemutwa Kaptum Kokwao Forest Associations (KAPKAKO) in the year 2008. This association was registered as a community initiative aimed at rehabilitating a large section of Kapchemutwa

forest with indigenous trees that would reduce demand for timber sourced from exotic trees, especially cypress (Kuto, O.I., 2022). Oral interview with the Chairman of Kapkako Forest Associations stated that, forests in Elgeyo Marakwet that were once characterized by birds chirping and singing have lost their charm with the planting of exotic trees that have been harvested since independence.

However, in the recent past, there has been wanton destruction of government's forests in Elgeyo Marakwet (Chebii, O.I., 2022). Key informants' interviews indicated that, with the formation of Kapkako Forest Associations, farmers were allocated sections of degraded forest land under Plantation Establishment Livelihood Scheme (PELIS). The community cultivated potatoes, beans, maize, and grass for livestock fodder in exchange for planting tree seedlings provided by Kenya Forest Service at Msekekwa and Sin'gore stations. This initiative has led to partial restoration of depleted forest, albeit, at a slower rate (Kemboi, O.I. 2022).

Despite efforts by Kapkako Forest Associations to restore forest cover, it is important to note that, Elgeyo Marakwet County has in the recent past faced serious environmental degradation challenges, particularly on forest resources. This degradation is primarily due to over-exploitation of forests through indiscriminate harvesting of plantations (GOK, 2013). To address this issue, County Government of Elgeyo Marakwet, in its County Integrated Development Plan (CIDP) 2013–2017, proposed full enforcement of various government acts and laws that protect environment and undertake reforestation programmes for open-gazetted public and community forest areas (GOK, 2013).

Based on the discussions, it can be argued that original intention of *shamba system* was to boost food security for communities living adjacent to government forest lands while at the

same time promote environmental conservation through nurturing young trees. However, the system later metamorphosized into a tool for politicians to appropriate substantial government forest land for agricultural production, often allocating it to family members, clans, friends, and supporters, with little or no replanting efforts. This misuse of shamba system led to extensive and unregulated deforestation and cultivation, thus, altering local ecology, potentially contributing to climate change, consequently affecting food production and food security. Furthermore, government's inconsistent policies including periodic banning and lifting of the shamba system, disrupted reforestation programs and adversely affected agro-pastoral economy and food production of the Elgeyo Marakwet community.

4.8 Summary

This chapter has examined government policies and legislations and their impact on agro pastoral economy and ecology, 1963–2013. These policies and legislations initiated economic changes which directly or indirectly transformed agro-pastoral ecology, economy and food security in Elgeyo Marakwet. Most notable of these policies was land adjudication policy that introduced private land tenure system. This policy caused competition and subdivision of land into uneconomical sizes, thus, disrupting agro-pastoral production. Establishment of Kerio Valley Development Authority aimed to rehabilitate Marakwet irrigation furrows but failed. Similarly, government policing policy to curb cattle rustling in Marakwet, Kerio Valley were ineffective, introduction of new crops and establishment of hybrid maize research station in Kitale and introduction of shamba system policy in Elgeyo Marakwet government forest lands to boost crop production and food security. These policies collectively contributed to the transformation of the region's ecology and agro pastoral production, thus, food insecurity.

CHAPTER FIVE
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This study aimed to analyze ecological change and food security in Elgeyo Marakwet County, Kenya, 1850–2013. It examined the relationship between agro-pastoral economy of the people of Elgeyo Marakwet and their ecology, 1850-1895. The study also evaluated the factors that led to the transformation of Elgeyo Marakwet ecology and their impacts on food production and food security during the colonial period, 1895–1963, and finally, assessed the impact of government policies and legislations on ecology, agro-pastoral economy and food security during the post-colonial period, 1963-2013. This chapter provides a concise overview of major findings and offers recommendations for policy formulation and implementation in ecological management and conservation, agro-pastoral economy, and food security.

5.2 Findings on Elgeyo Marakwet Agro-pastoral Economy and Ecology, 1850-1895

The pre-colonial history of the people of Elgeyo Marakwet reflects a society whose agro-pastoral economy and other forms of food acquisition were intimately connected to the environment. The region's physiographic characteristics have over the years determined the community's agro-pastoral economic activities and socio-political organization. The community developed an agro-pastoral system that varied with ecological zones. They were highly attuned to nature, utilizing their environmental knowledge to sustain themselves. Thus, their agro pastoral production systems were chosen based on a clear understanding of their environment.

They adapted to and thrived in their fragile ecosystem primary through their predominant reliance on agro-pastoral activities for their livelihoods. This close association between food

production systems and biodiversity conservation indicated that their subsistence agro-pastoral economy was inherently ecological. Consequently, Elgeyo Marakwet society integrated crop cultivation with livestock keeping in a set of agro-ecological strategies, which assured them of a wide range of subsistence products and food security. Their agro-pastoral economy operated within a well-understood and effectively managed ecological system, serving as their main means of sustenance and ensured food security.

They also exhibited a profound understanding of their ecology through a diverse array of social-economic activities, including livestock keeping, crop cultivation, hunting and gathering, food preservation, cattle raiding, crop storage, environmental conservation, weather forecasting, land ownership systems, and furrow irrigation. These social-economic networks were instrumental in indigenous agro-pastoral communities, enabling them to mitigate impacts of droughts and food shortages by leveraging their ecological knowledge. Thus, Elgeyo Marakwet communities emerged as a highly skilled and knowledgeable group, adept at utilizing their environment and proficient in their pursuits to produce food. Their innovativeness, dynamism, efficiency, diversity, and self-sustenance were reflected in all facets of their agricultural and livestock-based economy in relation to their environment.

Land tenure system in the pre-colonial Elgeyo Marakwet was structured to ensure that the community's resources were accessible to all its members. Land was collectively utilized by the community, with all members having access to resources such as saltlicks, rivers, watering points, foot paths, and vegetation. However, land ownership was not entirely communal but was clan-owned. However, land adjacent to households was individually owned for agro-pastoral production. Possession of multiple clan land across diverse environmental and ecological zones was Elgeyo Marakwet’s strategy in mitigating the risks

of food shortage. This approach allowed the community to balance the effects of agro-pastoral failures in one zone by relying on successful production in another, thus, enhancing their overall food security and resilience against ecological or economic disruptions. This diversity and flexibility in land ownership reflected the Elgeyo Marakwet's understanding and adaptation to their environment.

They demonstrated considerable ingenuity and effectiveness in land preparation, seed selection, weeding, harvesting, and food storage. Social dynamics of food production were intricate and focused on improving both adequacy and security of food, particularly at the household level. The communities' knowledge on fertile soils, vegetation, seasons, pests and diseases, and healthy seeds attests to their innovativeness and mastery of their natural environment. Therefore, traditional ecological knowledge demonstrated that the people of Elgeyo Marakwet developed advanced ecological conservation skills, which are evident in their farming methods and technology.

The community cultivated local maize, millet and sorghum. Finger millet held paramount significance in their agricultural practices. Local maize was susceptible to weevil damage. Finger millet had the ability to be preserved for a long period of time, up to five years or more due to its smallness. Therefore, cultivation of millet and sorghum guaranteed food stability in the region.

The Elgeyo and Marakwet communities exhibited clear distinct division of labour in food crop production. Men were tasked with responsibility of clearing fields and herding cattle and goats, while women were entrusted with cultivation, weeding, and harvesting of a variety of food crops that were drought-tolerant. This division of labour contributed to ahigh level of

proficiency in their understanding and management of their environment for food production and food security.

The practice of labour exchange by the Elgeyo Marakwet community was also essential for managing large-scale agricultural tasks such as planting, weeding and harvesting, as well as pastoral activities such as herding. Through labour exchange, the people of Elgeyo Marakwet could share and exchange knowledge and skills related to both agriculture and livestock management. This exchange of expertise contributed to improved practices in crop cultivation, livestock breeding, and land management, leading to enhanced agro-pastoral production and food security. Labor exchange networks in herding and managing livestock supported mobility of livestock in accessing grazing lands across different ecological zones, particularly during dry seasons. This collective approach helped the Elgeyo Marakwet communities to better withstand environmental stresses, such as droughts and to recover more quickly from disruptions of their means of production.

They also possessed distinctive indigenous knowledge systems for monitoring and adapting to weather fluctuations, enabling them to timely plan and cultivate food crops. This enabled them to determine precise timing of changeover between dry season and wet season, or vice versa. They were sufficiently prepared for sowing, weeding, and harvesting seasons. Thus, they had a unique understanding of their environment and expertise, which can be acknowledged as the foundation of their agro-pastoral economy and food security.

The Elgeyo and Marakwet applied one or multiple local weather indicators to predict start of rains or droughts. These included observation of wind patterns, movement of birds, ants, position of stars, and change of moon’s cycle. These were based on their mastery and

perception of their ecology. Utilization of indigenous knowledge systems in monitoring weather fluctuations resulted in a notable enhancement of food availability within the community, and, therefore, their important contribution to agro-pastoral production and food security was recognized.

They had intensive knowledge on proper storage structures (*Kapchoge*) for seed and food crop storage, which prevented seeds and different food crops from being destroyed by pests or damaged by rodents. Additionally, the community had separate storage facilities designated for the husband and for the wife or wives. Hence, they were able to sustain food supplies in their households up to the next planting season. This demonstrate that appropriate utilization of storage facilities was a very efficient method for mitigating hunger in the pre-colonial Elgeyo Marakwet. Thus, people of Elgeyo Marakwet had substantial influence on their environment through their mastery and perception of their ecology.

The study established that the community deliberately selected and stored strong and healthy quality seeds in *tobot* for the next planting season, used fallow farming, intercropping, and shifting cultivation techniques. This enhanced soil fertility, preserved soil moisture, suppressed soil weed growth, and facilitated natural soil fertilization, hence optimizing food crop yields in a well-managed ecological system.

The people of Elgeyo Marakwet possessed extensive knowledge of soil characteristics, allowing them to assess suitability of different types of soils for growing food crops. This expertise, gained through use of a variety of plants as indicators of either fertile soil or infertile soil enabled them to enhance food crop production by effectively utilizing their natural environment. The techniques of shifting cultivation and inter-cropping were used to

optimize productivity with limited labour and moisture. This had a positive impact on ecological management and assurance of food security.

Livestock keeping was another crucial aspect of their economy. They kept cattle and goats. These livestock were well-suited for their specific ecological conditions, particularly Kerio Valley ecological zone. They exhibited profound expertise and comprehension in livestock management, including knowledge of grass varieties, animal classifications, livestock ailments and remedies, as well as milk and meat preservation techniques. Livestock served multiple purposes, provided milk, meat, and blood, used to solve disputes, pay fines, gain bride wealth, and for sacrificial purposes.

A sophisticated animal lending system (*kemindo/kimanakta*) provided everyone with chance to obtain milk for their household, even if they didn't possess any animal. Additionally, it served as a means to guard one's stock against ecological disasters, such as epidemics and drought. Raiding for livestock from their neighbors the Pokot, and Tugen, had an ultimate objective of restocking their animals especially after loss due to drought or outbreak of pest and diseases. Livestock raiding seems to have been an integral component of the pre-colonial Elgeyo Marakwet food production system.

The Elgeyo Marakwet’s traditional knowledge on environmental conservation was richly embedded in their culture, as reflected in preservation of sacred trees and vegetation. This is evidenced by existence of sacred trees and vegetation that had been set aside for various cultural practices and those along river banks. Thus, the community demonstrated a well-managed and controlled ecological environment for agro-pastoral production and food security.

Hunting and gathering system of appropriation of subsistence from the natural environment, particularly in Kerio Valley and Elgeyo Marakwet escarpment, was an established economic activity among the Elgeyo and Marakwet as a way of supplementing their food. The community demonstrated sophisticated knowledge and skill in the art of hunting. Selective hunting to reduce depletion of wild stock demonstrated the communities' adeptness in their ecology. They also collected termites as well as edible plants and roots. These economic systems maintained a balance between food acquisition activities and nature, which seldom undermined resource sustainability. Finally, the people of Elgeyo Marakwet established food trade relations among themselves and with their more fortunate neighbors, the Pokot and Tugen. This ensured they had a reliable source of food during periods of scarcity. However, colonialism interfered with most of these features without introducing viable ecological and food-coping mechanisms.

5.3 Findings on Colonialism and the Transformation of the Elgeyo Marakwet Agro-pastoral Economy and Ecology, 1895 -1963

The study identified numerous contributions of colonial policies to the transformation of the Elgeyo Marakwet ecosystem and agro-pastoral economy. Some of these colonial policies include land alienation and settler squatter systems, wage labour and tax policies, introduction of new crops, Second World War, and seizure of livestock. The implementation of these colonial policies set in motion processes that made the Elgeyo Marakwet increasingly susceptible to environmental disruptions and food shortages.

Prior to colonization, indigenous economic systems of the people of Elgeyo Marakwet depicted deep knowledge and understanding of their ecology, resource management and conservation, and food production systems. However, with colonialism, adaptability of the Elgeyo Marakwet to their environment was interfered with. The interference was apparent in the alteration of land use patterns, traditional agro-pastoral knowledge, and technology, among other factors. Thus, advent of colonialism had a profound impact on ethno-science and social organization of the Elgeyo Marakwet, which had hitherto given the society a fair margin of security against environmental hazards and food insecurity.

The coming of Europeans changed forms of land ownership and rights to access and use land among the people of Elgeyo Marakwet. Land tenure system, which was a major resource base in agro-pastoral economy and ecological conservation, suffered massive land alienation, particularly in the highland ecological zone that was well-suited for agro pastoral economy. This was done without paying respect to indigenous socio-economic as well as ecological management and conservation practices, and other organizational structures that existed in the pre-colonial period. This disrupted and disregarded their ecological knowledge and agro pastoral economy and food production systems.

It confined the people of Elgeyo Marakwet to the escarpment and Kerio Valley ecological zones, where agro-pastoral activities would prove ecologically unsustainable. Lack of access to the ecologically suited highland zone meant that the people of Elgeyo Marakwet could no longer practice their sustainable agricultural and ecological conservation methods, leading to over-exploitation of the Kerio valley ecological zone. This resulted in soil erosion, depletion of vegetation, and a decline in biodiversity. The disruption of traditional land management

practices also led to the loss of indigenous knowledge related to ecological conservation, further exacerbating environmental degradation and food insecurity.

European alienation of highland ecological zone resulted in displacement of Elgeyo Marakwet people from their grazing grounds. It severed their access to salt licks and water sources. The loss of access to salt licks and vital water sources weakened the health and productivity of their livestock. As a result, the community became more susceptible to food shortages despite the favorable ecological conditions of their area. It also weakened the indigenous institutions under clan elders that had governed the community's ecological conservation practices and agro-pastoral economy. These institutions had played a key role in managing land use, ensuring equitable access to resources, and maintaining ecological sustainability.

With their traditional lands and resources controlled by colonial powers, the Elgeyo Marakwet's ability to enforce these institutions diminished. This erosion of indigenous governance further contributed to the community's vulnerability to food shortages, as their ecological conservation practices were no longer effective in the new and constrained environment. Over time, the compounded effects of ecological degradation and the weakening of traditional institutions left the Elgeyo Marakwet increasingly vulnerable to the challenges of food insecurity, a stark contrast to their pre-colonial resilience. Thus, colonial government imposed ecological landscape domination over the people of Elgeyo Marakwet to disrupt and marginalize their pre-colonial agro-pastoral economic systems, food production and food security.

Furthermore, colonial authorities subjected state taxes to the people of Elgeyo Marakwet. To meet tax demands, many Elgeyo Marakwet households had to shift their focus from traditional conservation practices to more immediate economic activities. The pressure to generate income or goods for taxation purposes led to overexploitation of land and natural resources, as traditional practices that helped manage these resources sustainably were abandoned. This led to erosion, deforestation, loss of biodiversity and decline of ecological balance necessary for sustainable agro-pastoral economy and food security.

Imposition of taxes also had direct implications on food security. As resources were diverted to meet tax demands, less attention was given to maintaining ecological conservation practices and agricultural productivity. The sale of livestock to pay taxes reduced the community's capacity to produce food, resulting in decreased agricultural production. Taxation also forced people to hide and establish hamlets in the escarpment ledges to evade paying tax. This disrupted the escarpment ecosystem that was water catchment areas, interfering with rivers and streams for agro-pastoral production. Moreover, the neglect of traditional conservation practices exacerbated soil degradation and reduced crop yields, further straining agro-pastoral economy and food security.

The colonial state enacted labour laws. These laws adversely affected Elgeyo Marakwet agro pastoral economy, it forced them to provide wage labour in the European settler plantations. The shift towards wage labour disrupted traditional farming practices that were essential for environmental conservation. Ecological conservation activities such as crop rotation, shifting cultivation, and rotational grazing systems were neglected as labourers focused on generating income through wage work. The reduction in labour for these practices led to overuse of land, increased soil erosion, and a decline in agricultural productivity. The absence of traditional

management practices further exacerbated degradation of the ecological balance and food insecurity.

The demand for wage labour during the colonial era often led to the migration of Elgeyo Marakwet men from their traditional agro-pastoral activities to work on settler farms or in other colonial enterprises. This migration drained the community of labour that was previously dedicated to managing agricultural and environmental resources. This reduction in agricultural labour led to lower crop yields and diminished livestock productivity, contributing to food shortages. The reliance on wage labour also made the people of Elgeyo Marakwet more vulnerable to fluctuations in the colonial economy, further impacting their ability to maintain food security.

Settler farmers, with their intensive agricultural methods and technology, disregarded the ecological management and sustainable practices of the Elgeyo Marakwet, leading to environmental degradation. Settlers competed with indigenous inhabitants of Elgeyo Marakwet in land, water, crop cultivation, livestock keeping, and labour resources especially in highland ecological zone. This exacerbated pressure on the indigenous systems of resource management and conservation. As more men were drawn away from their homes to work on settler farms and other European enterprises, the labour required for maintaining traditional conservation practices and for agro-pastoral activities dwindled. Reduced labour force led to the neglect of essential conservation activities, such as maintaining irrigation systems, conserving environment and managing grazing lands, contributed to environmental degradation and, ultimately, food insecurity.

The introduction of new crops and the widespread adoption of monoculture maize production had profound effects on ecological balance and conservation practices in Elgeyo Marakwet region. This shift in agricultural practices, driven by colonial policies, led to significant environmental and agricultural challenges. Emphasis on monoculture maize production resulted in extensive soil erosion and ecological deterioration. Monoculture reduced the diversity of plant species and disrupted traditional farming systems that were finely tuned to the Elgeyo Marakwet's ecology. Without the benefits of crop rotation and the use of cover crops, soil erosion increased, leading to the loss of fertile topsoil and a decline in soil productivity.

Traditional farming methods, such as shifting cultivation, crop rotation, and the cultivation of drought-tolerant food crops like millet and sorghum that were crucial for Elgeyo Marakwet's food security, were marginalized by colonial agricultural policies. These methods had been integral to the Elgeyo Marakwet's approach to ecological conservation and sustainable land management. Shifting cultivation allowed for the natural regeneration of soil nutrients, while crop rotation helped prevent soil depletion and pest infestations. The cultivation of diverse, drought-tolerant crops provided resilience against environmental stressors and contributed to food security.

The newly introduced crops in the Kerio Valley ecological zone were less suited to the environmental conditions of the region. The monoculture maize, in particular, was more vulnerable to increased temperatures and low rainfall especially in Kerio Valley ecological zone. This lack of adaptation to local conditions exacerbated the impact of ecological deterioration, as these crops struggled to thrive under the stresses of the altered environment.

The Second World War had profound effects on the Elgeyo Marakwet's agro-pastoral economy and their ability to manage and conserve their environment. The war effort led to significant disruptions in traditional practices, further straining the ecological balance that had sustained the community for generations. Many Elgeyo Marakwet households were compelled to give up their livestock as part of a "collaborative effort" to support the war. This depastoralization not only reduced the community's primary economic resource but also disrupted the traditional land management and conservation systems that ensured sustainable agro pastoral economy and food security.

The conscription of young, energetic men from the Elgeyo Marakwet community to participate in the war had a significant impact on family labour organization and labour-exchange availability for agro-pastoral activities. With fewer hands available to tend to livestock, maintain irrigation systems, and manage crops, the traditional practices of environmental conservation suffered. The absence of these men weakened the community's ability to carry out essential tasks like rotational grazing, water conservation, and soil management, leading to overgrazing, soil erosion, and reduced agro pastoral production.

The conscription of men also contributed to the erosion of ecological knowledge, as younger generations were often the ones responsible for learning and carrying forward traditional practices. With many of these men away at war, the transmission of knowledge related to sustainable land and resource management was disrupted. This loss of knowledge further weakened the community's ability to manage their environment effectively for agro-pastoral production and food security. Thus, the combined effects of depastoralization and labour conscription exacerbated food insecurity in Elgeyo Marakwet. With fewer livestock to support the economy and a diminished labour force to manage agro pastoral activities, the

community faced significant challenges in maintaining agro pastoral production and food security.

Furthermore, Elgeyo Marakwet reserves experienced extensive agricultural deterioration and severe soil degradation due to over-cultivation and overgrazing. The war effort diverted resources and labour away from traditional farming and livestock keeping, exacerbating the neglect of sustainable practices. The overuse of land, coupled with inadequate soil conservation measures, led to significant erosion and loss of soil fertility. This degradation made it increasingly difficult for the community to maintain productive farmland, further undermining their ability to grow sufficient food.

The failure to incorporate the Elgeyo Marakwet's traditional ecological conservation and agro-pastoral practices into colonial agricultural policies led to a mismatch between the community's needs and the colonial administration's focus on large-scale food crop production. The colonial push for increased food production did not take into account the ecological and sustainable land management practices that had been developed over generations by the Elgeyo Marakwet. These practices, which included rotational grazing, mixed cropping, and the maintenance of soil fertility through traditional methods, were vital for preventing environmental degradation and ensuring long-term agricultural productivity. The decline in agro-pastoral production due to ecological deterioration had severe implications for food security in Elgeyo Marakwet community. The loss of soil fertility, coupled with the inadequacy of new crops to withstand local ecological conditions, led to reduced crop yields and increased food shortages.

Colonial policies had detrimental effects on livestock economy. Livestock were confiscated from the people of Elgeyo-Marakwet as a means of exerting control and enforcing submission. This practice significantly reduced the size of herds, which were central to the community's wealth, social status, economic stability and food security. The loss of livestock weakened the traditional agro-pastoral economy, reducing the community's ability to sustain themselves and manage their livelihoods. These policies were driven by the colonial administration's objectives of maximizing resource extraction, consolidating control, and promoting settler agriculture at the expense of indigenous agro-pastoral systems.

Colonial policies disrupted ecological and traditional livestock practices such as communal grazing, seasonal migrations, and cattle raiding between the people of Elgeyo Marakwet and their neighbours. These practices were crucial for maintaining ecological resources, health and sustainability of the herds. Destocking policy, imposition of new regulations, such as restrictions on movement and grazing of livestock, undermined these practices, leading to overgrazing, loss of pasture, and a decline in livestock productivity. This led to decline in the resilience and sustainability of the livestock economy and food security.

Colonial alienation of the Elgeyo Marakwet’s highland ecological zone for European settlers reduced available grazing areas for livestock production. The loss of highland grazing lands, which were critical for salt licks, water and dry-season grazing, forced the community to overuse the pastures and salt licks in the Kerio valley and escarpment ecological zone. Ecological management practices such as seasonal rotational grazing practices that had been developed over generations between Kerio Valley, escarpment and highland ecological zones to manage the delicate ecosystems of the region were neglected, leading to long-term environmental degradation. The pre-colonial institutions pertaining to livestock keeping, and

building up large herds of cattle through raiding were disrupted and destroyed by the colonial Authorities. This in turn, led to reduced agro-pastoral production and increased food insecurity.

In a nutshell, levying of taxes, land alienation, enlistment of Elgeyo Marakwet into wage labour for settler farming and world wars, introduction of new crops, and destocking policy were all set to disrupt ecological management and conservation practices and agro-pastoral economy landscape of the Elgeyo Marakwet. Implementation of colonial economic policies had a significant impact on the pre-colonial agro-pastoral economy and its ecology by altering social and ecological organization of agro pastoral economy, a factor that undermined and weakened collective efforts to address food shortages.

5.4 Findings on Elgeyo Marakwet Agro-pastoral Economy and Ecology during the Post-Colonial Period, 1963-2013

The study has identified several contributions of government policies and legislations that have negatively interfered with the Elgeyo Marakwet's ecological set-up, agro-pastoral economy and food security in the post-colonial period. Most of the notable policies and legislation were on land tenure, irrigation schemes, cattle rustling, agro-pastoral production, and *shamba system* agriculture. The government policies and legislation set in motion processes that made Elgeyo Marakwet region vulnerable to ecological fluctuations and food insecurity.

Land adjudication policy that introduced private land tenure system in Elgeyo Marakwet led to fragmentation of land. This fragmentation hindered cohesive and sustainable ecological management practices, making it difficult to implement coordinated conservation efforts. The

disruption of traditional communal land management practices, which had been more effective in maintaining ecological sustainability, resulted in increased environmental degradation and food insecurity. The small plots limited the ability to practice shifting cultivation, fallow farming and disrupted rotational grazing systems between the Kerio Valley and the escarpment ecological zones. This fragmentation also hindered effective mechanization of farms and the adoption of modern farming techniques, such as crop rotation and use of fertilizers or manure, which are essential for boosting crop production and food security.

The reduction in available land led to encroachment into the Elgeyo Marakwet escarpment, as people sought to create more space for settlement and agro-pastoral production. This encroachment caused significant environmental degradation of the escarpment ecosystem. Private land tenure system and prospects of discovery of oil triggered land disputes in Kerio Valley ecological zone, creating insecurity that further affected agro-pastoral production. As a result, households struggled to produce enough food for their consumption, directly impacting food security. This outcome contradicted the government's policy argument that private land tenure and individualized titles would enhance agro-pastoral production by providing security of tenure.

The government, in collaboration with the Marakwet community, made efforts to improve and modernize the Marakwet irrigation furrow systems through the Kerio Valley Development Authority (KVDA) programs. Under these programs, KVDA was to provide cement and technical manpower, while Marakwet community was to provide labour and funds for repairing the irrigation furrows. Despite these intentions, the program was unsuccessful due to financial strain it placed on the community, which discouraged

participation. Therefore, external intervention carried out by KVDA with the goal of enhancing irrigation furrows through the process of cementing was not successful. As a result of failure to repair irrigation furrows, coupled with ecological changes, seepages and leakages occurred in Marakwet-owned furrows. This inefficient water management exacerbated ecological degradation, affected soil moisture levels, and compromised irrigation infrastructure. This undermined efforts to achieve sustainable food production and environmental conservation.

In the pre-colonial Elgeyo Marakwet, cattle raiding was governed by cultural customs and served as a means of livestock restocking for food security, particularly after droughts or epidemics. This traditional practice involved using bows, arrows, and spears to scare away livestock owners. In post-colonial period, it evolved into a commercial activity involving firearms to forcibly acquire livestock.

Government efforts to curb cattle rustling, through various security measures such as establishing police stations in the area, deploying police as a policy action, recruiting Kenya Police Reservists as additional security providers, and conducting operations to confiscate firearms, were largely unsuccessful. Instead, these measures often exacerbated the problem, leading to loss of lives, destruction of property, and disrupting agro-pastoral economy. Increased incidents of cattle rustling forced inhabitants of Kerio valley to move and settle in escarpment ecological zone. This zone was considered safer from raiders who had taken over the entire Marakwet Kerio Valley. This displacement disrupted traditional grazing patterns, a pre-colonial ecological conservation strategy, leading to overgrazing of the safer escarpment ecological zone, which resulted to soil degradation, loss of vegetation, reduced biodiversity,

and disrupted natural flow of streams and rivers that provided water for irrigated agriculture and livestock production in Kerio valley ecological zone.

The rise in cattle rustling also led to abandonment of various government and non-governmental initiated development projects aimed at improving agricultural production, conservation initiatives and food security. These include KVDA agricultural programs, livestock upgrading at Kapkondot centre, Chepkum, and Loyapat irrigation schemes in Tot, funded by KVDA, a 100-acre Tot-Kolowa Irrigation Scheme, funded by Kenya Red Cross. These projects were aimed to ensure security or peace, ecological conservation, agricultural production and food security. Therefore, the act of cattle rustling has had severe ecological degradation, disrupted traditional grazing patterns, livestock production systems, and significantly undermined the long-term ecological sustainability of livestock economic systems and food security.

Government efforts to introduce new crops such as hybrid maize, tea, coffee, and cotton through various policies and legislations disrupted, disregarded and suppressed indigenous agricultural practices such as shifting cultivation and mixed cropping practices that had been developed over centuries to suit the region's ecological environment for sustainable agro-pastoral production and food security.

The shift to monoculture of hybrid maize led to changes in traditional land use patterns, including expansion of cultivated land at the expense of grazing areas, forests and communal lands. This not only reduced land available for agro-pastoral production, but also disrupted agro-pastoral traditional ecological conservation practices. This ecological disruption, along with the inability to maintain stable maize production due to land degradation, diminished

agricultural productivity and posed a threat to food security. The failure to adapt to the new cropping systems jeopardized food availability and access, highlighting the crucial link between ecological conservation, effective land management, and sustainable food security.

Finally, *shamba system* agriculture that was introduced in Elgeyo Marakwet government forests as a strategy to conserve forests while allowing farmers to cultivate food crops alongside replanting and tending to tree seedlings to maturity was abused by Kenya Forest Service officials who allocated themselves huge chunks of forest land with little attention to plant or tend tree seedlings. This led to destruction or neglect of planted trees. Politicians also exploited the system by corruptly allocating forest land to their supporters, relatives, and friends, disregarding technical recommendations for effective *shamba system* development.

The misuse of *shamba system* resulted in significant environmental degradation, including forest encroachment, over-exploitation of forest resources, poor tree tending, and low survival rates of planted trees. These disrupted forest ecological systems, adversely affecting water cycle by reducing ground water recharge and streamflow, leading to water scarcity for agro-pastoral production. The negative environmental impacts mirrored broader challenges faced by the *shamba system* across Kenya, ultimately forcing the government to ban the practice through a Presidential decree in the year 2003.

The termination of the *shamba system* agriculture led to loss of access to fertile forest land, which had been used for crop production and grazing. This disruption increased the community's vulnerability to food insecurity, as the people of Elgeyo Marakwet faced significant challenges in sustaining their livelihoods and meeting their food needs without access to fertile forest land. The loss of this economic resource severely impacted their ability

to produce sufficient food and maintain their traditional agro-pastoral practices. Thus, weakening environmental management and conservation efforts, contributing to adverse effects on forest cover, ecosystem balance, water resources and food security.

5.5 Conclusion on the Elgeyo Marakwet Agro-pastoral Economy and Ecology, 1850-1895

This study concludes that the Elgeyo Marakwet's deep knowledge of their habitat was a great asset to them. Based on their ecological expertise, they devised elaborate strategies through which the environment was tamed and harnessed for agro-pastoral production and food security. These strategies were enforced through strict social norms and cultural traditions. Thus, they developed conservation ethos where natural ecosystems were valued for providing, regulating, and supporting services in relation to agro-pastoral production and food security. This led to communal usage and conservation of ecosystems with strong local controls to safeguard continued services for agro pastoral economy and food security.

The People of Elgeyo Marakwet utilized their experience and adaptability of their environment in food production and food security through communal land tenure system, livestock keeping, crop cultivation, hunting and gathering, food preservation, cattle raiding, storage of harvested crops, environmental conservation, weather forecasting, land tenure systems, and furrow irrigation in order to enhance food supply and food security in the community.

Communal land tenure system was pivotal in strengthening the Elgeyo Marakwet's agro-pastoral economy and ensuring equitable access to essential resources such as water, grazing

lands, and salt licks. This system facilitated effective utilization of diverse ecological zones, thus reducing ecological degradation and minimizing the impact of localized failures on food production. Additionally, their social organization, characterized by traditional labour exchange networks and a clear division of labour, contributed significantly to the efficiency and sustainability of agricultural and pastoral practices for ecological conservation and food security.

The Elgeyo Marakwet's agro-pastoral economy was intricately aligned with their natural environment through a combination of crop cultivation, livestock keeping, hunting, gathering, and food preservation. This holistic approach not only enhanced land productivity but also functioned as an effective ecological conservation strategy, mitigating risks associated with environmental fluctuations such as droughts and pest outbreaks. By integrating these diverse practices, the community maintained a stable and varied food sources, which was crucial for ensuring food security in a challenging environment.

The community's profound environmental knowledge extended to weather forecasting, knowledge on soil fertility, and environmental conservation. Their adeptness at predicting seasonal changes and applying techniques such as intercropping and shifting cultivation enabled them to maximize food production while preserving the ecosystem. Furthermore, their methods of seed selection and food storage were critical in sustaining a reliable food supply throughout the year, even during times of scarcity, thus, sustainable food security.

In addition to agro-pastoral activities, the Elgeyo Marakwet engaged in hunting, gathering, and trade, which provided supplementary sources of food, therefore enhancing their subsistence security. The strategic management of ecological resources, combined with their

social and economic systems, allowed them to maintain a delicate balance between food production and environmental sustainability. This multifaceted approach ensured their resilience and adaptability in subsistence strategies, demonstrating their capacity to thrive amidst environmental challenges, sustain food production and food security.

This study concludes that Agro-pastoral systems in Elgeyo Marakwet before colonization were shaped by indigenous ecological adaptation, reciprocal influence, and feedback mechanisms between the communities and ecosystems. Ecological design of traditional Elgeyo and Marakwet life provided a sustaining foundation for their agro-pastoral economy and food security.

5.6 Conclusion on colonialism and the Transformation of the Elgeyo Marakwet Ecology and Agro-pastoral Economy, 1895 -1963

In pursuing factors shaping ecological change, agro-pastoral economy and food security in the colonial Elgeyo Marakwet, this study encounters considerable evidence of detrimental influence of the colonial policies on ecology, agro-pastoral economy, and food security. The establishment of colonial rule in Elgeyo Marakwet brought about a number of external regulations and influences that were set to gradually modify and alter the pre-colonial ecological conservation and agro pastoral economic systems.

Colonial economic policies such as land alienation and settler squatter systems, wage labour and tax policies, introduction of new crops, impact of the Second World War, and destocking policy or seizure of livestock exhibited a clear bias against Elgeyo Marakwet's indigenous ecological conservation and agro-pastoral practices. It disrupted the pre-existing human-environment relations, ecological conservation systems and conventional modes of food

production systems that had been honed over generations, ensuring food security in Elgeyo Marakwet.

This study concludes that, imposition of colonial rule in Elgeyo Marakwet disrupted land ownership and access, critically altering the indigenous agro-pastoral economy and ecological conservation practices. Alienation of the highland ecological zone, crucial for sustainable practices, forced the community into ecologically unsustainable areas of escarpment and Kerio valley ecological zones, resulting to environmental degradation and biodiversity loss. This, coupled with weakening of indigenous institutions and severance from vital resources, exacerbated food insecurity. The compounded effects of these changes left the Elgeyo Marakwet increasingly vulnerable to food shortages, marking a stark departure from their pre-colonial resilience and sustainability.

Imposition of colonial taxation in Elgeyo Marakwet disrupted the community's traditional agro-pastoral economy and ecological management practices. Alienation of vital lands and resources, combined with pressure to meet tax demands, led to the abandonment of sustainable conservation practices. It also forced people to hide and establish hamlets in the escarpment ledges to evade paying tax. This resulted in significant environmental degradation, reduced agro-pastoral productivity, and weakened food security. The compounded effects of these colonial policies left the Elgeyo Marakwet community increasingly vulnerable to ecological imbalance and food shortages that was sustainable in the pre-colonial period.

Colonial labor laws severely disrupted Elgeyo Marakwet’s agro-pastoral economy by forcing a shift towards wage labor, which undermined traditional farming practices essential for

environmental conservation and food security. The migration of labor away from traditional agricultural activities led to ecological degradation, reduced agricultural productivity, and increased vulnerability to food shortages. The community's reliance on wage labor further exposed them to the instability of the colonial economy, compounding their challenges in maintaining ecological balance and food security.

Settler farming and their intensive agricultural practices severely disrupted ecological conservation and sustainable resource management systems of the Elgeyo Marakwet. The competition for land, water, and labor intensified pressures on indigenous practices, leading to environmental degradation. As labor was redirected towards settler enterprises, essential conservation activities and agro-pastoral management were neglected. This neglect, combined with increased environmental degradation, significantly contributed to erosion of food security among the Elgeyo Marakwet.

Introduction of new crops and the widespread adoption of monoculture maize production under colonial policies had a detrimental impact on the ecological balance and conservation practices in Elgeyo Marakwet. The shift towards monoculture maize led to extensive soil erosion and ecological deterioration due to reduced plant diversity and the abandonment of traditional practices like cultivation of drought resistant crops, fallow farming, crop rotation and shifting cultivation. These traditional methods, essential for soil regeneration and resilience, were marginalized, resulting in land degradation and reduced agricultural productivity. The monoculture maize, poorly suited to the Kerio Valley’s environmental conditions, intensified the effects of ecological stress, leading to further agricultural and environmental challenges and food insecurity.

Destocking policy, confiscation of livestock and the imposition of restrictive regulations weakened the community's traditional agro-pastoral economy, disrupting key ecological conservation practices such as communal grazing, seasonal rotational grazing, and cattle raiding. These disruptions led to overgrazing, loss of pasture, and decreased livestock productivity, thus, diminishing food security and economic stability. Alienation of critical highland grazing areas for European settlers further aggravated food insecurity forcing the community to overuse remaining pastures and neglect traditional grazing practices that ensured ecological conservation and adequate food production. This resulted in long-term environmental degradation and erosion of sustainable livestock management practices.

In a nutshell, the study concludes that despite climatic factors, colonial state's policies on land alienation and settler squatter systems, wage labour and tax policies, introduction of new crops, impact of Second World War, and seizure of livestock heightened frequency and intensity of ecological change, disrupted ecological conservation practices, agro-pastoral economic systems and food security in Elgeyo Marakwet. Thus, roots of ecological change and food shortage problems in Elgeyo Marakwet today can be traced back to disruptive and deleterious colonial economic policies, which had a profound impact on the region's ecological management, agro-pastoral economy, and responses to food problems.

5.7 Conclusion on the Elgeyo Marakwet Agro-pastoral Economy during the Post-colonial Period, 1963-2013

This study observed that many of the post-independence issues regarding unsustainable ecological conservation and food insecurity can be attributed to erosion of indigenous social-economic structures during the colonial period. The Elgeyo Marakwet region today has undergone significant and relatively ecological changes and food insecurity. These changes

can be attributed to political, economic, and cultural changes that accompanied the post-colonial government policies and legislations on agro-pastoral economy.

Post-colonial government centralized policies and legislations lacked complexity and adaptability of ecology and local agro-pastoral systems, often leading to economic growth strategies that degraded ecological resources when enforced. These policies such as land adjudication, rehabilitation of irrigation furrows, control of cattle rustling menace, *shamba system* agriculture, had a significant disruptive impact on the locally adapted agro-pastoral systems and ecological management and conservation practices.

The shift from communal to individual land ownership, use and tenure in the post-colonial Elgeyo Marakwet through land adjudication profoundly impacted ecological conservation and food security. The transition led to competition and fragmentation of land, which were agro-pastoral assets, undermining traditional ecological management and conservation practices. Overgrazing and overcultivation became prevalent, reducing agro pastoral productivity and compromised food security.

This shift inadvertently rendered the community more susceptible to ecological degradation, as the communal land management systems, once essential for sustainable ecology and agro-pastoral production, have been severely threatened due to government policies promoting land privatization. These policies, based on misconceptions about communal land use and management, have inadvertently contributed to food insecurity. Food insecurity in Elgeyo Marakwet can therefore be attributed to factors such as ecological change, continuous land fragmentation, and reduced agro-pastoral production.

The post-colonial government's interventions to rehabilitate Marakwet furrow irrigation systems illustrate the complex relationship between indigenous environmental conservation practices, agro pastoral economy, and food security. These interventions disrupted traditional free and flexible system of shifting irrigation and cultivation that were vital to the Kerio Valley's ecological conservation. The newly introduced irrigation schemes by KVDA and Red Cross Kenya were predicated on the assumption that indigenous practices are outdated and inefficient, requiring modern interventions like piped water to address food insecurity. However, these external actors overlooked the strengths of traditional practices that had sustained the region for generations in terms of food production and food security.

This failure to recognize the historical contingencies inherent in the occurrence, and implementation of indigenous irrigation systems led to deterioration of the furrow systems, which were integral to the Marakwet agro-pastoral economy and food security. This interference has had a cascading effect on environmental conservation, as the disruption of traditional water management practices contributed to ecological imbalance. As a result, interference with these indigenous systems not only compromised environmental conservation efforts but also negatively impacted food security in the region. By undermining the ecological foundation of the Marakwet agro-pastoral economy, these modern interventions contributed to the challenges they sought to resolve, weakening the community's ability to produce food sustainably.

Livestock economy was a fundamental means of food production and food security among the people of Elgeyo Marakwet. However, ecological changes severely reduced access to essential livestock resources such as water and pasture, creating intense pressure on pastoralists in Kerio Valley ecological zone. This scarcity escalated cattle rustling and

conflicts creating an insecure environment. Consequently, it led to movement and settlement on escarpment ecological zone resulting to overgrazing and deforestation causing increased soil erosion, altering waters flows, loss of biodiversity, and landslides. Additionally, it led to abandonment of agricultural farms, homes, irrigation schemes in Kerio valley, further compounding food insecurity in the area.

The Kenyan government's attempt to address cattle rustling menace, through various security measures such as setting up police posts, deploying police as policy action, and recruitment and arming of Kenya Police Reservists, not only failed to resolve the underlying issues but also exacerbated conflicts, deepening misery among the people of Marakwet. As a result, undermined ecological conservation practices such as cross breeding though animal leasing, communal grazing and seasonal rotational grazing. Thus, contributed to decline in livestock economy and food security.

Shamba system agriculture was a good idea for crop production and forest conservation in Elgeyo Marakwet. However, government's policies and legislation designed for management of *shamba system* inadvertently ushered in corruption in allocation of forest lands by politicians and Kenya Forest Service officials. This led to a surge in deforestation of government forest lands and eventual ban of *shamba system*. Consequently, the disruption of crop production within *shamba system* arrangement caused food shortages among the people of Elgeyo Marakwet.

Finally, by way of general conclusion, this study underscored significant impact of colonial economic policies and legislations, as well as post-colonial government policies and legislations, on social and ecological fabric of the Elgeyo Marakwet's agro-pastoral economy.

These policies weakened the community's capacity to collectively manage ecological resources, sustain agro-pastoral production, and ensure food security. Depletion of natural resources within the Elgeyo Marakwet ecosystem and resulting food insecurity can be traced back to the detrimental effects of British colonial policies and inadequacies of post-independence government policies and legislations on agro-pastoral economy. Thus, the Elgeyo Marakwet community was estranged from their customary institutions that established equilibrium between ecological conservation and agro-pastoral economic systems that enhanced agro-pastoral production and food security. This in turn, compromised food security in Elgeyo Marakwet.

5.8 Recommendations

The study findings in objective one revealed that agro-pastoral economy in Elgeyo Marakwet operated within a well-managed and understood ecology that enhanced agro-pastoral production and food security in the pre-colonial period. The study findings in objective two and three revealed that disruption of the pre-colonial ecological and institutional set-up in the colonial and post-colonial periods was the greatest challenge to ecology, agro-pastoral production and food security among the Elgeyo Marakwet. Therefore, the region has been subjected to great ecological fluctuations and food insecurity due to effects of the colonial and post-colonial economic policies and legislation, especially on land and agro-pastoral economy.

This study, therefore, recommends that traditional institutions and knowledge remain central to ecological management and agro-pastoral production. Thus, it should be maintained and incorporated into the various government policies and legislation to ensure sustainable ecological management, agro-pastoral production and food security.

The people of Elgeyo Marakwet, particularly those inhabiting the Kerio Valley ecological zone, should shed cultural practices like cattle rustling that are detrimental to ecological conservation, and development process towards agro-pastoral production for food security in the area. They should also embrace new ideas and innovations, such as crossbreeding of livestock and adopting zero-grazing farming techniques.

Additionally, the government should involve local community in initiation and execution of agro pastoral policies, programmes, and legislations to ensure long-term sustainability. Furthermore, the study recommends that the people of Elgeyo Marakwet should adopt alternative non-agro pastoral economic activities as a means to reduce pressure on land, cattle rustling, and conflict related to communal land ownership.

The people of Elgeyo Marakwet living near government forests be sensitized on the importance of forests. This will ensure that they utilize shamba system agriculture effectively and efficiently, as envisaged in the main mission of *shamba system*, when new management practices of *shamba system* is introduced in the future in the study area.

Finally, this study recommends that agricultural production, being a devolved function under Kenya Constitution 2010, County governments should put in place policies and legislation to check on ecological degradation resulting from human socio-economic activities. For this to be achieved, it is imperative that ecological problems be adequately addressed. If the government fails to address ecological problems effectively, any attempts to attain food security and sustainability in Elgeyo Marakwet would be futile.

5.9 Suggestions for Further Research

The relationship between ecological change and food security is intricate. The economic developments brought about by the colonial and post-colonial government policies and legislations have largely influenced ecological transformation, agro pastoral production, and food security. However, there is need for further research investigations to examine interplay between traditional institutions, knowledge, and government policies, as well as legislations, and their impact on economic developments and food security in Kenya.

To achieve sustainable agro-pastoral production and ensure food security, further research should focus on enhancing traditional institutions and knowledge on agro-pastoral production and economic developments that are in harmony with ecology.

Given that terminal point of this study was 2013, when County governments were established following Kenya's general election on March 4, 2013under the 2010 Constitution, and agriculture being a devolved function, this study suggests further research on the role of County governments in ecological management and conservation, agro pastoral production and food security in marginal areas.

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	Name	Age	Date of interview	Place of interview
1	John Cherwon	84	21/3/2022	Arror
2	Michael Sigira	81	21/3/2022	Arror
3	Richard Mulwo	74	14/1/2022	Kaptarakwa
4	Peter Kipchoge	65	16/1/20022	Kokwao
5	Kenneth Cherop	64	06/4/2022	Kabulwo
6	Festus Kiprutto	-	18/4/2022	Kapsowar
7	Benjamin Chepkonga	81	24/2/2022	Tambach
8	Vincent Koech	83	6/4/2022	Kabulwo
9	Simon Cheptot-County ecological expert	-	3/5/2022	Iten
10	Kimoi Kop Maiyo	84	06/4/2022	Kabulwo
11	Salina Toyoi	77	24/2/2022	Tambach
12	TalaaSerwon	85	12/2/22	Kabulwo
13	Kimaiyo Mutalal	75	16/1/20022	Kokwao
14	Joseph Sawe	80	4/7/2022	Kaplolo
15	John Komen	83	4/7/2022	Kaplolo
16	Titus Kipruto	-	6/6/22	Anin
17	William Kalkal	69	12/2/22	Kabulwo
18	Mzee Barar	71	12/2/22	Kabulwo
19	John C, Ruto	82	3/5/2022	Iten
20	John Ego	82	7/7/22	Kapcherop
21	Daniel arap Kaluk	67	7/7/22	Sergoit
22	Joseph arap Msafiri	66	4/7/2022	Chebiemit
23	Mary Sawe	79	4/7/2022	Kaplolo
24	Kipkorir Busienei	71	22/4/2022	Kapsowar
25	Michael Tuitoek	76	24/2/2022	Tambach
26	Kimoi Cherwon	81	21/3/2022	Arror
27	Kirop Thomas	74	18/2/2022	Tot
28	Suter Kibowen	75	18/2/2022	Tot
29	Kimaiyo Murkomen	68	18/2/2022	Tot
30	Charles Kipkore	65	18/2/2022	Tot
31	Mathias Cheserek	74	18/2/2022	Tot
32	Kiptalai	-	18/2/2022	Tot
35	Joseph Kiptarus	76	25/8/2022	Kapcherop
36	Maiyo Mutwol	69	25/8/2022	Koitilial
37	Justine Kipkorir,	65	21/3/2022	Arror
	Timothy Kirotich	76	19/2/2022	Tot
39	Grace Krop	81	19/2/2022	Tot

40	Dennis Tallam	67	16/4/2022	Kaptagat
41	Christoper Chebii	68	7/6/2022	Kapchemutwa
42	William Chepkonga	79	7/6/2022	Kokwao
43	Pius Kemboi	74	16/6/2022	Kamariny
44	Cheboi arap Butangong	77	17/3/2022	Kapkoros
45	Chelan'ga John	68	3/5/2022	Kaptabuk
46	Chelimo Andrew	71	3/5/2022	Kaptabuk
47	Chemitei Kemboi	74	3/5/2022	Koibarak
47	Kimwetich Cheboi	81	17/3/2022	Kapcherop
48	William Chesergon	76	15/7/2022	Koisungur
49	Abraham Cheboi	66	10/8/2022	Rokocho
50	Kipkosgei Chan'gach	73	11/5/2022	Metkei
51	Kiptanui Ben	69	4/6/2022	ChesumanCheborwa
52	Pricilla Kimoi	75	17/5/22	Koibirir
54	James 'Ptanui	71	19/3/2022	Kuserwo
55	Martin Kiptanui	67	21/4/2022	Endo
56	Krop Kilimo	81	5/6/2022	Sengwer
57	Rebbeca Soti	74	19/4/2022	Kipkaner
58	Samuel Biwot	65	6/5/2022	Sambirir
59	Silas Kipkurui	68	13/8/2022	Embotot
60	William Barchok	73	7/6/2022	Chebiemit
61	Mwalimu arap Chesang	69	4/7/2022	Sengwer
62	John Kipyego	65	14/4/2022	Cherangany
63	James Kogo	79	9/3/2022	Arror
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KNA/DC/UG/2/1	Uasin Gishu District Annual Political Record File
KNA/DC/UG/2/1	Uasin Gishu District Annual Report, 1909-1933.
DC/ELGM/1/1	Elgeyo-Marakwet District Annual Report 1912-1927, the file has issued by the DC Mr. E.B. Hosking, ET a l
_____	1928-1932, this file contains the annual reports of Elgeyo-Marakwet issued by the D.C. Mr. E.B. Hosking, et a l
_____	1933-1937, This file contains the annual report for Elgeyo- Marakwet issued by the D.C.s Messrs. J.M. Silver and L.T. Davenport.
KNA/DC/ELGM/2/1	Elgeyo-Marakwet District Annual Report, 1926-1959.This file contains the Handing over reports.
KNA/DC/ELGM/3/1/2	1911-1958, This file is in the form of a Political Record book.
KNA/DC/ELGM/4/1	This file contains miscellaneous correspondence on the Keiyo and Marakwet.
KNA/DC/ELGM/5/1	This file contains information about the Keiyo-Marakwet land tenure system. Notably is the Hosking-Barton memorandum in relation to Native (Keiyo) rights in the Grogan Forest Concession - 1921-1956.
KNA/DC/ELGM/6/1 1919-1928	This file contains confidential correspondence on the Keiyo and Marakwet.
KNA/DC/Bar/3/3	This file contains material on Baringo Political District record book.
KNA/DC/UG/2/1	This file is on the Uasin Gishu political record book.240
KNA/DC/TAMB/2/2/10/8	This file contains material on Kendur Salt Lick, 1929-1956.
KNADC/TAMB/1/7/1	This file contains Administration Labour Complaints – 1930-1938.
KNA/DC/TAMB/1/2/1	Reports on food shortage in Elgeyo and Marakwet- 1937-1946.
KNA/DC/TAMB/1/2/3	Correspondence dealing with control of price of potatoes, 1943-1948. 15.
KNA/DC/TAMB/1/2/4	Correspondence dealing with purchase of livestock.
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APPENDICES

Appendix 1: Letter of Introduction for the Researcher

My name is Caleb Kemboi Cherop, I am a postgraduate student at Jaramogi Oginga Odinga University of Science and Technology and pursuing a Doctor of Philosophy Degree in History. To accomplish my Doctorate thesis titled **"Ecological Change and Food Security in Elgeyo Marakwet County, 1850-2013"**, I kindly request you to assist in providing the required information for this study by participating in these interview/discussions. Your views will be considered important to this study; your facilitation towards the success of this noble exercise will be highly appreciated. All the information provided will be treated with utmost confidence.

Thank you very much for your co-operation.

Yours sincerely

Caleb Kemboi Cherop

PhD Student- (Jaramogi Oginga Odinga University of Science and Technology)

Appendix 2: Letter of Introduction for the Research Assistant

This is to introduce Mr./Mrs./Miss…….as a research assistant helping in the conduct of a research on **"Ecological Change and Food Security in Elgeyo Marakwet County, 1850-2013"**. The purpose of this study is to examine and document on ecological change and food security in Elgeyo Marakwet in the pre-colonial, colonial and post-colonial epochs. The information you will provide will assist in writing academic thesis as part of fulfilling the requirements for award of a Degree of Doctor of Philosophy (in History) of Jaramogi Oginga Odinga University of Science and Technology. I kindly request you to assist in providing the required information for this study by participating in these interview/discussions. The information collected will be treated with utmost confidence and only used for this purpose. I thank you in advance for your support in carrying out this exercise.

Yours Sincerely,

For, Caleb Kemboi Cherop

PhD Student- (Jaramogi Oginga Odinga University of Science and Technology)

Appendix 3: Key Informant Interview Guide

Participants Consent Form for Key informant interviews

I hereby agree to participate in this interview/Focus group discussion on the research topic **"Ecological Change and Food Security in Elgeyo Marakwet County, 1850-2013"**. I affirm that I will not communicate or in any manner disclose publicly information discussed during the course of this Interview. I agree not to talk about material relating to this study or interview with anyone outside of my interviewee.

Name: …….

Date: ……

Signature of Participant: …….

Signature of Researcher: …….

A). Pre-colonial Period

i. Where did the people of Elgeyo Marakwet originate from?
ii. When did the Elgeyo and Marakwet communities establish their environment in this region?
iii. How did the people of Elgeyo Marakwet interact with their environment in relation to agro pastoral economy during the pre-colonial period?
iv. Apart from agro-pastoral activities, were there any non-agro-pastoral activities that contributed to food production and food security during the pre-colonial period?
v. What type of land ownership systems existed in the pre-colonial Elgeyo Marakwet?
vi. How did indigenous social and political institutions contribute to the maintenance of ecological balance agro pastoral production systems and food security in this region?
vii. What roles did women play in ecological management and conservation, agro pastoral production and food security in pre-colonial Elgeyo Marakwet?
viii. How was the state of ecology, agro pastoral production, and food security in Elgeyo Marakwet during the pre-colonial period?

(B). Colonial Period

i. What economic activities were undertaken by the colonialists in Elgeyo Marakwet?
ii. What were some of the economic policies introduced in this area during colonial period?
iii. Discuss the impact of these colonial policies on land tenure, sustainable ecological conservation, agro-pastoral economy, and food security.
iv. How did the agro-pastoral Elgeyo and Marakwet communities respond to British presence and economic policies implemented during the colonial period, particularly in terms of ecological conservation and management of natural resources?
v. How was the state of ecology, agro-pastoral economy and food security in the Elgeyo Marakwet during the colonial period?

(C). Post-Colonial Period

i. What changes in agro pastoral production occurred in this region following independence?
ii. How do you assess the impact of agro pastoral polices on agro pastoral economy, ecological management and conservation, and food security in this area?
iii. Which government strategies and policies do you consider significant in relation to Elgeyo Marakwet's ecology, agro-pastoral economy and food security in this area?
iv. Has the government collaborated with the community in promoting ecological management and conservation, and agro pastoral production or food security?
v. Besides the government, are there other organizations involved in ecological conservation, agro pastoral production and food security in this region?
vi. In your opinion, are the existing government food security policies and legislations effective in addressing issues of ecological conservation, agro pastoral economy, and food insecurity?
vii. Was a new system of farming introduced in this area?
viii. What measures would you suggest should to achieve sustainable ecology, agro pastoral economy and food security in this area?

ix. In your view, does cattle rustling affect agro pastoral economic development? If yes, how and what are the potential consequences?

x. Was shamba system introduced in this area? If yes, what was its contribution to ecological conservation, agro-pastoral?

D. KVDA- Officers

(i) When was KVDA established in Kerio Valley?

(ii) Which agro pastoral programs is KVDA currently engaged in within this area?

(iii) Are there any community strategies that you consider significant for ecological management and conservation, agro pastoral economy and food security in this area?

(iv) Has the government collaborated with the community in promoting ecological management and conservation, agro pastoral production and food security measures?

(v) In your opinion, are government agro pastoral policies effective in managing the environment, agro pastoral production and addressing food insecurity in this area?

(vi) What measures would suggest to improve on ecological conservation, agro pastoral production, and food security in this area?

(vii) Based on your knowledge and experience, what is opinion on the Marakwet furrow irrigation and modern irrigation in regards to suitability and food security?

(viii) What are some of the causes of cattle rustling in this area, and how does it affect ecological conservation and agropastoral developments?

(E). Forester (s)

(i) When was shamba system introduced in this area?

(ii) How was forest cover before the introduction of shamba system in this area?

(iii) What economic changes were associated with the implementation of shamba system in this area?

(iv) How did the Department of Forest allocate plots within the forest in this region?

(v) In your opinion, did shamba system contribute to effective forest management in this area?

(vi) Why was Shamba system abolished?

(vii) What are some of the effects of the abolition of shamba system on the residents of this area and on the forests in this region?

(viii) How have forest policies influenced the management of shamba system in Elgeyo Marakwet?

(ix) Are there measures that have been put in place by the government to conduct afforestation programs and have the residents of this area been involved in these efforts?

(F). Ecological Expert (s)

(i) How would you describe the ecology of Elgeyo Marakwet?

(ii) Have there been any ecological change in this region?

(iii) What are some of the causes of these ecological changes in this region?

(iv) What are some of the effects of ecological change on agro pastoral economy and food security in this area?

(v) Has your department collaborated with the traditional ecological experts in this area?

(G). Agricultural Officers

(i) Are there any government agro pastoral production programs and/or policies that have been implemented in this area?

(ii) What are some of the impacts of these government programs and/or policies on ecology, agro pastoral production and food security in this area?

(iii) What challenges are facing these government programs in this region?

(iv) What is your opinion on the current state of ecology and food security in this region?

Appendix 4: Focus Group Discussion Guide

Letter of Introduction

My name is Caleb Kemboi Cherop, I am a postgraduate student at Jaramogi Oginga Odinga University of Science and Technology and pursuing a Doctor of Philosophy Degree in History. To accomplish my Doctorate thesis titled **"Ecological Change and Food Security in Elgeyo Marakwet County, 1850-2013"**. I kindly request you to assist in providing the required information for this study by participating in these interview/discussions. Your views will be considered important to this study; your facilitation towards the success of this noble exercise will be highly appreciated. All the information provided will be treated with utmost confidence.

Thank you very much for your co-operation.

Yours sincerely,

Caleb Kemboi Cherop

PhD Student- (Jaramogi Oginga Odinga University of Science and Technology)

Participants Consent Form for Focus Group Discussion

I/ We hereby agree to participate in this interview/Focus group discussion on the research topic **"Ecological Change and Food Security in Elgeyo Marakwet County, 1850-2013"**. I/We affirm that I will not communicate or in any manner disclose publicly information discussed during the course of this Interview / Focus group interview. I agree not to talk about material relating to this study or interview with anyone outside of my fellow focus group members / interviewee.

Name: …….

Date: ……

Signature of Participant: …….

Signature of Researcher: …….

(i) Based on your knowledge and experience, discuss the origin and migration of the people of Elgeyo Marakwet into their present settlement?

(ii) Based on your knowledge and experience, explain how the people of Elgeyo Marakwet organized themselves economically during: The pre-colonial period, colonial period, and post-colonial period?

(iii) Based on your knowledge and experience, describe the changes in economic activities during the following periods: Pre- colonial period, colonial period, post-colonial period.

(iv) Based on your knowledge and experience, discuss how the establishment of colonial and post-colonial government policies and legislations influenced economic changes based on: Change in land tenure system, Livestock keeping, Irrigation, and Introduction of new crops.

(v) Based on your knowledge and experience, explain the effects of these economic changes on ecological management and conservation, agro pastoral economy and food security?

Appendix 5: Observation Guide

1. What are the visible signs of forest degradation or deforestation observable in the study area?
2. What observable evidence of soil erosion can be noted in the study area?
3. What are the observable signs of landslides that can be identified in the study area?
4. What are visible signs of decay or deterioration are evident in the Marakwet irrigation furrow systems?
5. What observable conditions are evident in the vandalized irrigation pipes by cattle rustlers in Marakwet, Kerio valley?
6. How have these observable changes in forest cover, soil conditions, land, and irrigation system affected ecology, agro pastoral production and food security in the region?

Appendix 6: Photographs on Ecological Change Indicators

Plate 1: Soil erosion in Kerio Valley, Elgeyo Marakwet County

Source: Researcher, 2022

Plate 2: A section of deforested Kaptagat Forest in Elgeyo Marakwet County

Source: Researcher, 2022

Plate 3: Indigenous furrow irrigation system at Arror, Elgeyo Marakwet County

Source: Researcher, 2022

Plate 4: Landslide at Kapkonder area in Elgeyo Marakwet County

Source: Researcher, 2022

Appendix 7: Research Authorization from the University

JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE & TECHNOLOGY

BOARD OF POSTGRADUATE STUDIES
Office of the Director

Tel. 057-2501804
Email: bps@jooust.ac.ke

P.O. BOX 210 - 40601
BONDO

Our Ref Z162/4214/2020

Date: 14th December 2021

TO WHOM IT MAY CONCERN

RE: CALEB KEMBOI CHEROP– Z162/4214/2020

The above person is a bonafide postgraduate student of Jaramogi Oginga Odinga University of Science and Technology in the School of Education, Humanities and Social Sciences pursuing PhD in History. He has been authorized by the University to undertake research on the topic: *"Ecological Change and Food Security in Elgeyo Marakwet County, Kenya, Since 1850"*

Any assistance accorded he shall be appreciated.

Thank you.

JARAMOGI OGINGA ODINGA
DIRECTOR BOARD OF
POSTGRADUATE STUDIES
DATE
BOX 210 - 40601, BONDO
UNIVERSITY OF SCIENCE & TECHNOLOGY

For,
Prof. Dennis Ochuodho
DIRECTOR, BOARD OF POSTGRADUATE STUDIES

Appendix 8: Ethics Review Report

JARAMOGI OGINGA ODINGA
UNIVERSITY OF SCIENCE AND TECHNOLOGY

DIVISION OF RESEARCH, INNOVATION AND OUTREACH
JOOUST-ETHICS REVIEW OFFICE

Tel. 057-2501804
Email: erc@jooust.ac.ke
Website: www.jooust.ac.ke

P.O. BOX 210 - 40601
BONDO

OUR REF: JOOUST/DVC-RIO/ERC/E4

23rd March, 2022

Caleb Kemboi Cherop
SEHSS
JOOUST

Dear Mr. Cherop,

RE: APPROVAL TO CONDUCT RESEARCH TITLED "ECOLOGICAL CHANGE AND FOOD SECURITY IN ELGEYO MARAKAWET COUNTY, KENYA SINCE 1850"

This is to inform you that JOOUST ERC has reviewed and approved your above research proposal. Your application approval number is **ERC 23/03/22-8.** The approval period is from 23rd March, 2022 – 22nd March, 2023.

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations and violations) are submitted for review and approval by JOOUST IERC.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to NACOSTI IERC within 72 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks of affected safety or welfare of study participants and others or affect the integrity of the research must be reported to NACOSTI IERC within 72 hours.
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to JOOUST IERC.

Prior to commencing your study, you will be expected to obtain a research permit from National Commission for Science, Technology and Innovation (NACOSTI) https:oris.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely,

Prof. Francis Anga'wa
Chairman, JOOUST ERC
Copy to: Deputy Vice-Chancellor, RIO Director, BPS Dean, SEHSS

Appendix 9: Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 861627
21/December/2021

Date of Issue:

RESEARCH LICENSE

This is to Certify that Mr.. CALEB KEMBOI CHEROP of Jaramogi Oginga Odinga University of Science and Technology, has been licensed to conduct research in Elgeyo-Marakwet on the topic: ECOLOGICAL CHANGE AND FOOD SECURITY IN ELGEYO MARAKWET COUNTY, KENYA, SINCE 1850 for the period ending : 21/December/2022.

License No: NACOSTI/P/21/14971

861627

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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