DROUGHT AND SMALL-SCALE FARMING:

Coping Mechanisms and the Needs for Adaptation and Mitigation in Kenya's Narok and Nakuru Counties

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Abstract

A constant increase in droughts in Eastern Africa has impacted the region's agricultural sector. Small-scale farmers produce most of Kenya's agricultural output and are particularly vulnerable to drought. They also play a crucial role in combating such environmental shocks. This thesis aimed to explore how drought affects small-scale farmers in Kenya and what coping mechanisms they use. It further studied what was needed for small-scale farmers to implement adapting and mitigating strategies. These objectives were examined through the cases of Narok County and Nakuru County. An ethnographic field study was conducted to collect data through the qualitative methods of observations and semi-structured interviews. Finally, the findings were analyzed using a Political Ecological framework to explore drought's social, economic, and political implications and the importance of indigenous knowledge systems and local perspectives.

The findings showed that drought affects small-scale farmers through lower yields, fewer income opportunities, financial strains, food insecurity, and impaired well-being. The coping mechanisms small-scale farmers use are mainly indigenous agricultural conservation practices. They also use more technical equipment and non-agricultural solutions to cope. Financial, material, and information resources combined with local participation to create enabling policies and favorable environments are needed to implement adapting and mitigating strategies. Accountable networks are also needed, focusing on government support and the assistance of international actors. However, these networks showed to be influenced by economic and political interests relating to mainstream ideas of development.

Keywords: Drought, Kenya, Small-scale farmer, Indigenous knowledge, Development, Adaptation, Mitigation, Climate change

Contents

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Definitions

Small-scale farmer

Is, in this thesis, a farmer with a low asset base operating on up to 10 hectares of land.

Indigenous knowledge

In this thesis, refers to "the information that local people have established over time, and continues to improve for use. It is founded on the practice and understanding, often tried over times of use; it entails adaptation to native values and environs." (Muthee et al. 2019).

Coping mechanisms

Are the strategies people use to help manage stressful situations, which in this thesis is drought.

Adaptation

Is "the process of adjusting to the current and future effects of climate change." (European Environmental Agency n.d.). Adapting practices can entail changing to more drought-resistant crops or using tanks to hold water.

Mitigation

Refers to "making the impacts of climate change less severe by preventing or reducing the emission of greenhouse gases (GHG) into the atmosphere." (The European Environmental Agency n.d.) In this thesis, mitigation also refers to practices that prevent drought. Mitigating practices can include using green energy sources.

1. Introduction

Climate change is intimately linked to extreme weather conditions and disasters like severe droughts (UNFCCC 2011), which refer to prolonged dry periods (WHO n.d.). Africa is the continent most affected, where the low ability to adapt and high poverty rates intensify the effects of drought. Drought interferes with people's livelihoods and health (Lottering et al. 2021, 322) and significantly impacts the continent's agricultural sector (IPCC 2022). The Intergovernmental Panel on Climate Change (IPCC) predicts that continued global warming will only increase the occurrences and duration of drought in Africa (Trisos et al. 2022, 1290). Moreover, there has been a constant increase in drought events in Eastern Africa in the last decades, creating obstacles to development and welfare in the region (Shiferaw et al. 2014).

Kenya is a country in Eastern Africa, largely dependent on agricultural production, and the sector employs more than 70 percent of the country's rural population (Central Bank of Kenya 2022). Small-scale farming accounts for approximately 75 percent of Kenya's agricultural output (World Bank 2015, 2). Small-scale farmers are particularly vulnerable to climate change and drought as they largely depend on rainfall and the proper functioning of ecosystems (World Bank 2015, 5; Nwanze & Fan 2016, 14). The areas most susceptible to drought are arid and semi-arid regions (Schwabe et al. 2013), such as Narok County and parts of Nakuru County in western Kenya, where most of the population are small-scale farmers. Even during the regular dry period (December - March), the state of water access in Narok County has been lower than expected due to high evaporation and lack of rains (National Drought Management Authority n.d., 2). Nakuru County has seen a 15 percent decrease in one of its most important crops, maize, this year due to the prolonged drought (Lang'o 2023).

Both adaptation and mitigation strategies are needed to manage climate change and drought (Nwanze & Fan 2016). The arid and semi-arid areas, like Narok and parts of Nakuru, are where many drought-combating efforts in agriculture are allocated through international aid projects. For example, during 2014 - 2020, The European Union (EU) allocated €190 million in development aid for food security, resilience, and climate shocks, targeting small-scale farmers and drought in Kenya (European Court of Auditors 2020, 19).

IPCC (2022) points out that services for handling climate change should be directed by demand and specific to local settings to create sustainable outcomes. IPCC (2022) concludes that indigenous and local knowledge and expertise are essential for implementing strategies that work in local contexts. Small-scale farmers are vital in increasing climate change resilience and adapting to and mitigating drought (Nwanze & Fan 2016). However, they need support due to a lack of assets, poverty, and high climate change vulnerability. With the proper investments and strengthening initiatives, small-scale farmers can contribute to climate change and drought action and accomplish the Sustainable Development Goals (SDGs) (Nwanze & Fan 2016, 15).

Political Ecology, the theoretical framework of this thesis, is an approach widely used to study environmental issues, focusing on the social, political, and economic aspects of climate change impacts. Nwanze & Fan (2016, 16) argue that small-scale farmers can help boost biodiversity, lower greenhouse gas (GHG) emissions, and increase agricultural productivity. The results may also yield social and economic benefits both personally and on a societal level. Thus, there may be a will for small-scale farmers to combat climate change and drought, and many ideas on how to do so. However, sometimes, a lack of enabling environments or resources hinders implementation, which can be identified through the framework of Political Ecology.

Based on an ethnographic field study, this thesis aims to highlight how drought affects small-scale farmers in the counties of Narok and Nakuru and what mechanisms they use to cope with droughts. The intent is also to explore what small-scale farmers believe is needed to adapt to and mitigate droughts and the challenges they face in doing so.

1.1 Background

Kenya

Kenya is located on the eastern coast of Africa. It neighbors South Sudan to the northwest, Ethiopia to the north, Somalia to the east, Uganda to the west, and Tanzania to the south. It has a population of 53 million and is the 7th most populated country in Africa. Nairobi is the capital city, situated inland in south-central Kenya. Kenya has a tropical climate, and 80 percent of its land is considered arid or semi-arid. Christianity is the main religion, followed

by Islam. (Britannica n.d.) The primary professions are in agriculture, fishery, and forestry, contributing just above 20 percent of Kenya's GDP (World Bank 2021).

The counties of Narok and Nakuru

Narok and Nakuru are located in the Great Rift Valley in western Kenya (see Figure 1.). The largest cities are Narok Town and Nakuru Town. Narok is mainly covered in arid and semi-arid lands, whereas Nakuru has several climatic zones varying from humid to arid (MoALF 2016). The counties' most significant economic activities are pastoralism, tourism, manufacturing, and small-scale crop farming. Agriculture is primarily rainfed and depends on long rains during the rainy seasons (Kang'ethe & Kimathi 2013). The main crops are coffee, wheat, barley, maize, beans, and potatoes (Narok County Government n.d.; County Government of Nakuru n.d.).

The dominant ethnic groups in Narok are the Kalenjin and Maasai people. The Maasai are semi-nomadic people, mainly pastoralists, living in the Great Rift Valley and other areas in northern, central, and southern Kenya (Maasai Wilderness Conservation Trust n.d.). They are one of the ethnic groups in Kenya that have kept most of their traditional ways of living and culture into modern times (Maasai Wilderness Conservation Trust n.d.). As the Maasai rear cattle, sheep, and goats, drought immensely affects them, struggling to keep their animals alive (Western & Nightingale 2003). According to Kweyu et al. (2020), the Kalenjin ethnic group includes the Kipsikis, Nandi, and Pokot peoples living in central-western Kenya. The name Kalenjin was established during British colonial rule to refer to different tribes speaking the same language. The Kalenjins are primarily subsistence farmers and live in the Mau Forest Complex, among other areas in Narok (Kweyu et al. 2020).

Almost all ethnic groups can be found in Nakuru, but the Kalenjins are one of two more dominant groups, the other being Kikuyu, part of the Bantu people. The Kikuyu make up 70 percent of Nakuru's population, and the National Museums of Kenya (n.d.) explain that they were originally hunters and gatherers but went to live as nomadic farmers when pushed off their land by European settlers in the 1930s. Today, the Kikuyus are mainly active in agriculture, trade, and livestock keeping.

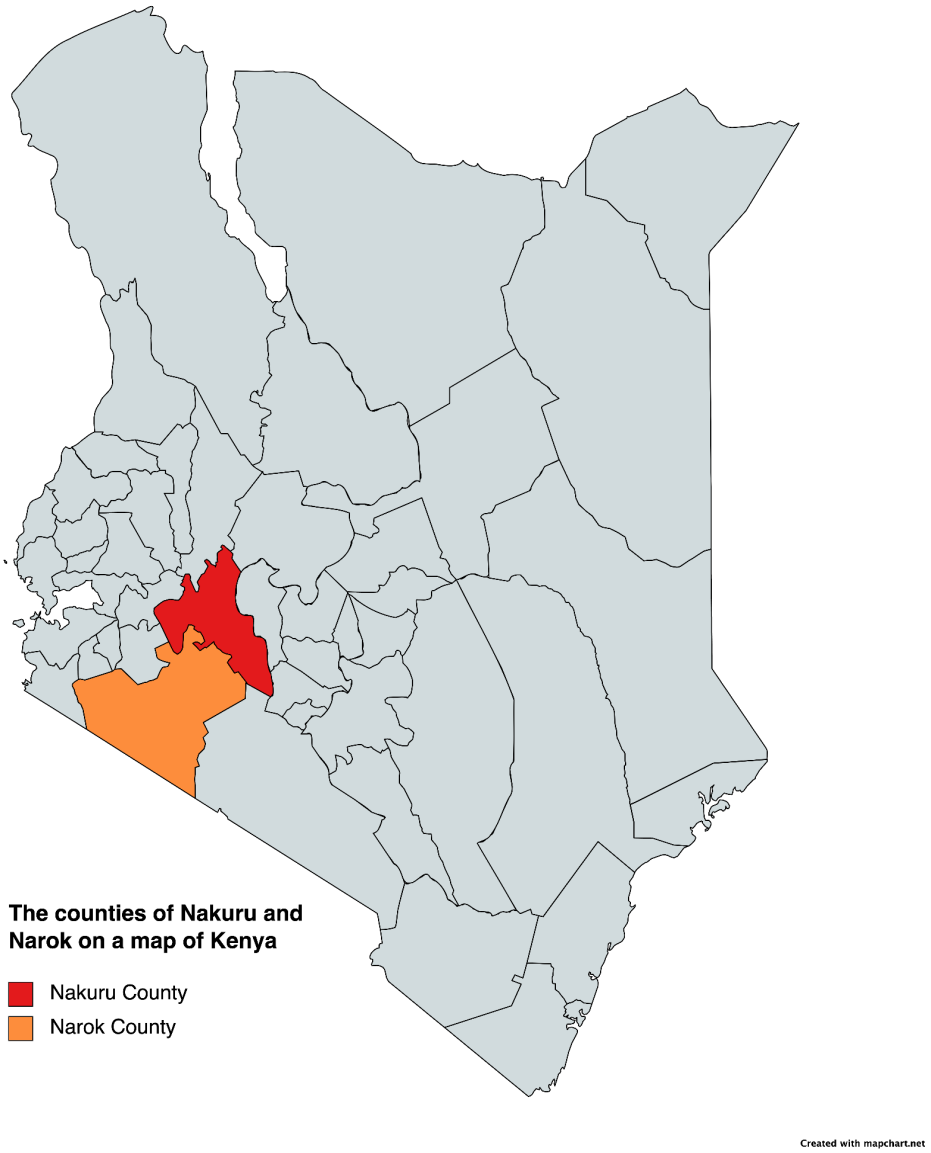

Figure 1. A map of the location of Nakuru County and Narok County in western Kenya (created through www.mapchart.net).

Narok and Nakuru are home to the Mau Forest Complex, considered one of Kenya's water towers (i.e., mountainous forest areas collecting and filtering water from, e.g., rain and snow, and containing multiple water sources, transporting water to rivers, lakes, and groundwater depots (Kenya Forestry Research Institute n.d.)) (Albertazzi et al. 2018, 2). The Mau Forest Complex is located on the border of the two counties and is Kenya's most significant water drainage basin and the area with the highest rainfall. The forest has been subject to deforestation for decades, primarily due to agricultural land expansion and population

increase in the forest areas. Mau Forest has lost a quarter of its size in the last twenty years. (Albertazzi et al., 2018, 2-3) As deforestation threatens the future of Mau Forest, the conservation of the forests' ecosystem has become a pressing issue, locally, nationally, and internationally. Kenyan authorities have implemented drastic measures to preserve the Mau Complex, evicting people living on the forest land. Human Rights Watch (2019) reports that evictions have been abusive by setting homesteads on fire and injuring people, violating international human rights law.

1.2 Purpose and Research Questions

The purpose of this thesis is to investigate how drought affects small-scale farmers in Kenya's Narok and Nakuru counties and what coping mechanisms they use. The thesis further aims to highlight what small-scale farmers believe they need to implement adapting and mitigating strategies. The purpose is not only to present the personal needs of the small-scale farmers but what they believe is needed in a broader sense, such as societal and political changes, resources, and farming practices. The ambition relates to the notion of paying attention to indigenous knowledge and local perspectives when studying activities on climate action and solutions to drought, as addressed in the introduction.

Highlighting the needs of small-scale farmers in the areas can suggest concrete steps to combat drought and facilitate effective action from engaged individuals, firms, organizations, and authorities. The results of this thesis may ensure that projects in the area consider knowledge, needs, conditions, and utility in the planning and execution. The aim is also to increase the knowledge of small-scale agricultural communities and drought and contribute to existing research on the topic. However, as this thesis highlights the consideration of local contextual settings, the aim is not to generalize the results to all other settings but to aim for transferability in similar contexts.

The aim is to answer the following two research questions to meet the overall objective of this thesis:

1. How does drought affect small-scale farmers in Narok and Nakuru counties, and what coping mechanisms do they use?

2. From the perspective of small-scale farmers, what is needed to implement adapting and mitigating strategies?

1.3 Delimitations

As presented below, certain aspects have been included and excluded to limit the scope of this thesis.

The target group is small-scale farmers, but currently, there is no clear definition of a small-scale farmer. Guided by the Food and Agriculture Organization (FAO) (2013) and the World Bank (Csaki & de Haan 2003), this thesis defines a small-scale farmer as a farmer with a low asset base operating on up to 10 hectares of land. This thesis only includes farmers over 18 who are partly or solely responsible for their own farms and practices. That is to avoid conflicts and speech limits if employed under another farmer. After a discussion with key connections in Kenya, it was decided to make no exclusions regarding gender, as both men and women are farmers in Narok and Nakuru. Drought and gender are important to discuss in terms of climate change. However, this thesis would be too broad if studying gendered aspects of drought in addition to the two research questions. That said, gender may be brought up when relevant.

As presented in the Background chapter, there are several ethnicities in Narok and Nakuru. Impacts, coping mechanisms, and needs may be influenced by ethnicity and is relevant to acknowledge when studying indigenous perspectives and small-scale farmers. Focusing on ethnicity could have revealed valuable information, but as there are several groups in Narok and Nakuru, the thesis makes no exclusions based on ethnicity. Nonetheless, some indigenous practices are intimately linked to ethnic background, and it will therefore be discussed in regard to some of the empirical findings.

This thesis is based on a case study geographically limited to the counties of Narok and Nakuru. The two counties are chosen through what Flyvbjerg (2006, 230) calls information-oriented selection, where parts of both counties are drought-prone and have a large agricultural population. They are thus considered to hold information relevant to the thesis' purpose. There is also diversity in the landscape throughout the areas, which likely affects farming conditions and needs that may contribute to variation in the findings. The thesis is limited to two counties only, allowing for a deeper case examination. Increasing the scope by including more counties would result in too much data for a study at this level and not necessarily any new findings. As 80 percent of the land in Kenya is arid and semi-arid

(UN Women 2022), Narok and parts of Nakuru are assumed to represent the drought situation in most parts of the country.

1.4 Disposition

This initial chapter **(1.)** has introduced the thesis' topic, purpose, and research questions, followed by its delimitations. Below is an overview of each chapter in the paper.

Chapter 2. discusses the previous research on the matter, focusing on international climate and aid efforts, methods and types of research, and indigenous knowledge.

Chapter 3. presents the theoretical framework, describing Political Ecology, aid and development politics, as well as networks and knowledge hierarchies.

Chapter 4. describes the method and material used in this thesis and the field and informants. A critical discussion and a section on reflexivity follow this.

Chapter 5. presents the empirical findings of this thesis.

Chapter 6. analyzes the empirical findings related to the theoretical framework.

Chapter 7. presents the conclusion, answering the overall objective of this thesis.

Chapter 8. comments on the implications of this thesis and suggests topics for further research.

2. Previous research

Climate change and small-scale agriculture are topics widely studied. Africa and, to some extent, Kenya have been subject to study because of the region's vulnerability to drought. However, IPCC (Trisos et al. 2022, 1289) reports that funding for climate-related research on Africa received less than 4 percent globally between 1990 and 2019. Interestingly, most research on climate action in Africa has been conducted outside of the continent. IPCC further reports that external researchers studying adaptation and mitigation of climate change effects in Africa may pay less attention to indigenous concerns and priorities than locally based researchers. This thesis aims to counteract this by specifically looking at local concerns

in the study context. Out of the 4 percent of funding, 78 percent went to research institutions in North America and the EU, which also are significant aid contributors (Trisos et al. 2022, 1289).

International Involvement and Aid

Oliver-Smith et al. (2019) show a broad range of research on climate disaster management in several parts of the world, including Kenya. Mitigation and effective response to disasters like droughts can rarely be delivered by governments solely (Oliver-Smith 2019, 9). Therefore, partnerships and alliances with private actors and international organizations are established. While international projects can significantly benefit communities, Oliver-Smith's (2019, 92) findings confirm the IPCC's view that local priorities risk being overlooked by external actors. Zaman (2019, 171) demonstrates this by referring to the "*technological fix approach"* pushed by aid actors to cope with flooding, another climate change effect. For example, the World Bank proposed technical strategies to minimize flooding by constructing embankments along rivers in Bangladesh. However, these barriers clashed with the design of the local river systems (Zaman 2019, 171). This technological fix missed how farmers have dealt with flooding for decades in traditional ways to reduce loss in crop production, for example. Literature on the topic refers to these *"culturally informed local adaptive practices"* as nonstructural strategies (Zaman 2019, 171).

As mentioned in the introduction, the EU, among many actors, provides development aid to Kenya to manage drought and transform small-scale farmers' practices (European Court of Auditors 2020, 20). The EU development aid to Kenya, focusing on food security and drought resilience, entailed projects integrating small-scale farmers into the commercial value chains and upgrading subsistence farming to farming for the market (European Court of Auditors 2020, 24). Easterly (2006) discusses foreign aid for alleviating poverty. Although he is not focusing on farmers or drought, he highlights an interesting point by analyzing what he calls *Planners* and *Searchers* in aid projects. The Planners' perspective is dominating international aid initiatives. Easterly (2006) argues that Planners organize projects from the top but lack knowledge of the context in which they should be implemented, whereas Searchers try to understand that setting. Planners believe local problems are an issue of technical engineering and that external actors have enough knowledge to solve them. At the same time, Searchers involve local actors and understand that issues are complex and often

involve technological, social, political, institutional, and economic aspects (Easterly 2006). This juxtaposition is prominent in the findings of this thesis and is described further in the chapters on Empirical Findings and Analysis.

Easterly (2006) underlines the importance of feedback and accountability in aid projects. That relates to another problem found through previous studies on international involvement and climate change: the lack of presence at project locations, hindering successful implementation (Oliver-Smith 2019, 92). However, national obstacles also stop international aid from contributing to effective disaster adaptation and mitigation in local communities. In the Analysis chapter, this problem is discussed further regarding drought and small-scale farmers in the case of Narok and Nakuru.

Research on Drought and Small-scale Agriculture in Kenya

Research on drought and small-scale farming is conducted both from abroad and in local settings, even in the counties of Narok and Nakuru (Zander et al. 2013). However, it is noticeable that there are some shortcomings concerning the local context that is studied: few papers study what visions small-scale farmers *themselves* have for managing drought and what *they* believe is important in order to implement adapting and mitigating strategies.

Ochieng et al. (2016) studied the effect climate change has had on the agricultural production of small-scale farmers in several counties in Kenya. The paper mainly analyzed the economic aspects of farming, meaning revenue and expenses, on which the results showed climate change has a negative impact. Their study is based on data collected over several years, and the design entails, like many other similar studies, a quantitative approach with surveys and a high number of participants. This thesis can be understood as taking off from where studies like Ochiengs et al. end, providing valuable additions to the existing quantitative data. Lastly, Ochieng et al. (2016) conclude that both adapting and mitigating strategies are critical for solving climate change challenges in the long run.

Martinez-Baron et al. (2018) state that farmers prioritize adaptive methods over mitigating ones because adaptive measures with direct results may resonate more with the small-scale agricultural lifestyle and short-term planning. Thus, adaptation is usually considered an entry point, of which practices may result in co-benefits for mitigation. Furthermore,

Martinez-Baron et al. (2018) analyze the scales of adaptation and mitigation. Mitigation is about reducing GHG emissions globally, whereas adaptation takes place locally, relating to the concerns of small-scale farmers. According to Laukkonen et al. (2009), mitigation is a global issue where actors and states in the Global North should be the most responsible concerning mitigation efforts. However, Martinez-Baron et al. (2018) argue that small-scale farmers are essential in increasing climate change resilience and lowering GHG emissions when mitigation benefits are incorporated into the adaptive measures. This thesis, thus, focuses on both elements.

Indigenous Practices and The Local Perspective

Muthee et al. (2019) explain that indigenous practices are central to Kenyan agriculture but that development actors have long neglected many traditional practices, suggesting a switch to modern or conventional agricultural systems. However, the authors claim that indigenous agricultural practices and knowledge systems are now receiving more recognition for improving agricultural production and coping with environmental stressors like drought.

Muthee et al. (2019) further discuss the importance of indigenous knowledge for small-scale farmers in Kenya and their different indigenous practices. They include agroforestry (i.e., incorporating trees in farming) for reforestation and combining various crops within the same farming area to benefit from their different qualities. Furthermore, organic farming is also an indigenous practice, just like crop rotation, which preserves the soil's Ph level. Muthee et al. (2019) claim that knowledge of the importance of keeping the topsoil layer intact has led to techniques to preserve soil moisture through low-plowing practices and water retention methods. In addition, indigenous knowledge systems are described to contain information about what crops are suitable for sustaining soil fertility and which plants can withstand drought.

Anthropological approaches offer holistic insights into environmental issues and how climate change effects, such as drought, impact local communities (Barnes et al. 2013). The methods anthropologists use are often in-depth and ethnographic, analyzing local coping mechanisms and how indigenous knowledge can contribute to research and planning effective adapting and mitigating strategies (Barnes et al. 2013). The significance of local and indigenous perspectives is studied by Apraku et al. (2021), who argue that indigenous knowledge is

central to handling climate change impacts in small-scale agriculture. Like this thesis, Apraku et al. (2021) examine this through field studies in Kenya and South Africa, using semi-structured interviews and observations to collect data. Hoffman and Oliver-Smith (2002, 12) claim that although much information can be gathered through quantitative methods, in-field ethnographic research provides a more comprehensive understanding of how people are impacted by and respond to disasters like drought.

As presented, there is much research done on climate action, drought, and small-scale farmers. Results show that strategies based on local knowledge are essential to handling the challenges of climate change (Apraku et al. 2021, 9-10). However, a gap still exists: What is needed to implement these strategies from the perspective of small-scale farmers concerning drought? The intent is to use the results of previous research to implement and compare to the particular context of this thesis.

3. Theoretical Framework

Upon starting the field study in Kenya, my preconceived notion was that small-scale farmers would describe drought in a predominantly ecological manner. However, the informants discussed drought impacts, coping mechanisms, and adaptation and mitigation related to national politics, policies, resources, and international organizations. This thesis thus understands drought as a multi-dimensional issue. It applies the framework of Political Ecology to explain the different aspects of being a small-scale farmer in Narok and Nakuru affected by drought.

Political Ecology

Political Ecology is an interdisciplinary approach often used in Development studies to examine local and global environmental issues and power relations in socio-ecological systems (Benjaminsen & Svarstad 2018). Environmental issues and shocks like drought cannot be described as purely ecological. Benjaminsen and Svarstad (2018) explain that vulnerability, coping capacity, and solutions depend on government facilitation or prevention, international interests and policies, and global markets. For example, small-scale farmers are in the socio-ecological system, contingent on external factors, e.g., price spikes, and internal factors, e.g., loss of crops due to pests (Van der Lee et al. 2022).

Political Ecology is a critical perspective countering the idea that the environment is apolitical. It challenges the powerful actors and the mainstream vision of development and proper environmental behavior. Benjaminsen and Svarstad (2018) claim that environmental policies always involve resource allocation and land use discussions. Michel Foucault has contributed to the field of Political Ecology by studying the powerful discourses influencing how we see environmental issues and their impact on development, focusing on the truths we take for granted (Benjaminsen & Svarstad 2018). Another contributor to the Political Ecological approach is James Scott (1977). He conducted studies investigating the agency and rationale of small-scale agricultural communities regarding their farming ways and the environment. Scott challenged the collectively seen truths of modernization in handling climate change impacts. Political Ecology can provide a holistic approach to the findings of this thesis and help understand what aspects influence small-scale farmers' challenges, coping mechanisms, and needs for implementing adapting and mitigating strategies. It is also relevant for analysis between the local and global.

Development and Aid as Politics

Crewe and Axelby (2013, 3) discuss development from an anthropological perspective, seeing the concept as the social, economic, and political goals pursued through planned interventions. Thus, no development aid is neutral (Oliver-Smith 2019, 236) and serves a purpose. Bonacker et al. (2017, 6) explain that ethnographic studies indicate that the term development is a Western concept in which ideas on appropriate behavior are transferred to the local level through international aid interventions. Development from this perspective reveals unequal power distribution in networks of those who give and receive aid (Mosse 2013). Crewe and Axelby (2013, 54) mention how the largest aid-giving states are all Western. That is relevant as most climate change research also is conducted by Western countries that are significant contributors to global warming (Trisos et al. 2022, 1289), contradicting the proper behaviors they attempt to enforce through aid.

Ideas of development and the focus of aid change with time. As described in the chapter on Previous Research, small-scale farmers have become a target group for development aid initiatives, striving to make them drought resilient through a series of transformative measures (European Court of Auditors 2020; World Bank 2022). The EU development vision

for small-scale farmers is to introduce them to commercial value chains (European Court of Auditors 2020, 24). However, the market is governed by neoliberal policies, meaning the farmers may have to adapt to such regulations to succeed (Crewe & Axelby 2013, 162). Seeing development and aid as politics may help explain the situation in Narok and Nakuru and the outcome of drought projects.

Networks, Power Relations, and Knowledge Hierarchies

Martinez-Baron et al. (2018) demonstrate that networks are central to understanding communities' responses to climate shocks. Networks between individual farmers and communities may increase capacity and spread knowledge on adaptation and mitigation measures (Martinez-Baron et al. 2018). Networks between institutions can facilitate climate change research and put local climate practices and issues on the international agenda. Governments and aid agencies are here seen as partners in development (Crewe & Axelby 2013, 74), collaborating on handling climate change disasters, such as drought (Oliver-Smith 2019). Networks between individuals and institutions include farmers, national and county-level governments, aid agencies, and non-governmental organizations (NGOs). Martinez-Baron et al. (2018) describe NGOs as *"knowledge brokers,"* and Chandra et al. (2016) state they can have a meaningful role in climate and development initiatives as they can interact across scales.

Despite the benefits, Crewe and Axelby (2013, 152-155) note that the notion of Western NGOs having certain expertise creates knowledge hierarchies. The Western modern and technological approach is seen as superior and separated from traditional or indigenous knowledge systems, reflecting relations between aid-giving and aid-receiving countries (Crewe & Axelby 2013, 132-133; 153). The authors further suggest that it may be the location and identity of the knowledge holder rather than the particular knowledge itself that matters. The knowledge held by powerful actors tends to get more attention, and local people in the Global South have thus been excluded from participation in "knowledge production" (Crewe & Axelby 2013, 153). However, indigenous knowledge has been vital to coping with climate change effects in Africa. Local conservation practices have gained increased awareness globally for their capacities to prepare for and adapt to climate change, with mitigation benefits (Crewe & Axelby 2013, 149). Still, these knowledge systems have not been incorporated into modern science systems, underlining the gap this thesis has acknowledged.

Handling climate change in small-scale agriculture is generally influenced by assets and livelihoods (Martinez-Baron et al. 2018), and if not considered, actions may render ineffective and even increase vulnerabilities. Coping with drought *"depend on the enabling environment"* (Maleksaeidi and Karami 2013, 274), underlining that environmental issues come with social, economic, and political implications.

4. Method and Material

Data was collected through ethnographic fieldwork in Kenya, focusing on the cases of Narok County and Nakuru County in the western part of the country. The thesis has a qualitative approach to investigate the personal experiences related to the research problem, such as the effects of drought, coping strategies, and adaptation and mitigation needs. In other words, to examine the meaning individuals attribute to a social or human problem, following the social-constructivist knowledge claim (Cresswell 2003).

Ethical Considerations

The informants have been informed of the purpose of this thesis and have given consent for their responses to be included in this paper. When interviewing, informants were told they could refuse to answer specific questions and stop participating without repercussions. Every informant is anonymous; therefore, the names mentioned are pseudonyms. That also applies to connections and intermediaries who have assisted with the field study. Furthermore, measures were always taken to respect the communities involved in the study, including being responsive, learning local customs, and establishing relationships to the extent possible.

Data Collection, Registration, and Analysis

Data were collected through observations and semi-structured interviews with 24 small-scale farmers in the counties of Narok and Nakuru. In addition, a semi-structured interview was conducted with a representative from *Kenya Small-Scale Farmers Forum* (KESSFF) for new perspectives and with a large-scale farmer for comparison purposes. The primary informants of the thesis were small-scale farmers. They were men and women over 18, of all ethnicities and religions, and were all within the definition of a small-scale farmer used in this thesis. As mentioned in the Delimitations chapter, men and women are in charge of farming, leaving no reason to limit the study to one gender. In Narok and Nakuru, the main religion is

Christianity, and informants were primarily Christian. Although not asked about ethnicity, informants may have belonged to one of the three main ethnic groups in the counties, i.e., the Maasais, Kalenjins, and Kikuyus, or any of the minority groups. The informants were selected through convenience sampling through connections and snowball sampling as the study progressed.

The method of semi-structured interviews was chosen to find patterns and themes related to the selected research problem of this thesis. Schensul and LeCompte (2013, 171-172) explain that semi-structured interviews are exploratory and open-ended and therefore allow for in-depth questions to understand the individual experiences of respondents on a particular topic. The interviews had a clear structure with predetermined themes relating to the thesis' research questions for operationalization. The questions went from simple to more in-depth and focused on various themes, such as drought impacts and farming practices. The structure of the interviews helped to ensure that relevant data was collected while simultaneously creating a relaxed atmosphere where participants could speak freely on the different topics. Nonetheless, flexibility was key, and every interview was different.

The interviews were registered by making hand notes and phone recordings. During the interviews, a classmate, who was also doing fieldwork, was present, so there could be alternation in taking notes and asking questions. That ensured that all information was registered and that one person could always focus on the informant being interviewed. The semi-structured interviews occurred with one informant at a time or sometimes two for the participants' comfort. Responses often led to follow-up questions, uncovering other relevant information (see Appendix A. for an example of asked questions).

Permission was asked to record, and in almost all cases, it was granted. For privacy purposes, all recordings are deleted after the completion of this thesis, of which participants were informed. After recording, transcription occurred close in time to the interviews themselves to facilitate the process. Edited transcription was the selected method to make the outcome as close to the original recording as possible but without unnecessary words or sounds like mumbling or stuttering.

Observations as a data collection method were an important complement to the semi-structured interviews. Schensul and LeCompte (2013, 83) suggest that observations are

the initial step in conducting fieldwork to get to know the research context. Observations were conducted throughout the stay in Kenya but mainly occurred in connection to interviews with informants on or near their farms. The observations provided a better understanding of the information in the respondent's testimonies. If interviews had occurred in an office or at a café, it would have been difficult to fully comprehend the challenges of drought. For example, I could see the dried-up rivers, dead crops, and malnourished animals that informants described. That also went for the coping mechanisms, adaptation, and mitigation needs, seeing the drilled wells, equipment, or lack thereof. The observations were fully participatory when walking around the farm and engaging in the practices and more passive, e.g., when visiting a farmers' training session to listen but not engage. The data obtained during observations were registered through field notes by hand or on the phone, or through pictures. The pictures helped with remembering the field and the state of the different locations.

A qualitative content analysis was used to analyze the data. Boréus and Bergström (2018) describe this method as relevant for analyzing large amount of data that requires interpretation, e.g., interview transcriptions. A coding scheme was constructed, dividing the material into categories and sub-categories. The main categories related to the research questions to keep the process cohesive throughout. For example, one of the main categories was drought impact, for which the data was divided into the sub-categories of economic, social, and agricultural impacts, et cetera. The relevant information from each transcribed interview was then collected in a table for an easy overview to detect patterns in the material.

Field and Informants

The design of inquiry used was a case study of Narok County and Nakuru County to analyze the research questions in-depth. During field trips, the starting point was in Narok Town or Nakuru Town, with accessible communication to different parts of the counties. I volunteer at a non-profit organization, Action10, working to empower entrepreneurs in Sub-Saharan Africa. My colleagues from the Kenyan branch of Action10 assisted in finding appropriate study locations and informants. One colleague living in Narok and close to Nakuru, Theo, was present on every field trip and functioned as a link to small-scale farmers in rural villages and local leaders and managers of farming projects around the counties. Theo's agricultural research background and area knowledge made him a vital connection for the field study.

Having worked together, Theo was someone to trust, ask questions, and discuss issues that arose during the fieldwork. Through Theo, cultural and local norms and traditions were learned to handle meetings with informants respectfully. Theo had a broad network that could be utilized to conduct the study, which is how I came in contact with the second connection, Noah, a team leader for climate-smart farming initiatives around Narok and Nakuru. Noah knew of many small-scale agricultural communities, which led to data being collected from areas that could only have been reached with assistance.

Data was primarily collected in rural villages in the two counties with the help of Theo and Noah. Farmers were visited and interviewed on their farms, at gatherings, or community trainings. I also attended an intimate conference for small-scale farmers, which was an excellent opportunity to conduct interviews. The field was characterized by ambiguity as schedules often changed with short notice. Flexibility and patience were thus paramount.

The majority of informants in this thesis showed to be combining subsistence agriculture (i.e., producing for their own use) with producing to sell on the local markets. The main crops were maize, potatoes, beans, and carrots. In a few instances, they also grew fruits such as passionfruit. Additionally, some farmers kept animals such as cows, sheep, and goats. Almost all interviewed farmers practiced rainfed agriculture (i.e., they depended on rain to grow their crops). Besides the rain, rivers were one of the only water sources accessible to farmers.

In general, the informants were glad to provide information for the thesis. As drought is an acute problem for people in these counties, they appreciated the external engagement and that the issue was brought to light. The data collection process went more smoothly than expected, as few hesitated to participate. The eagerness to participate could be attributed to expecting something in return, such as money or assistance. However, many expressed satisfaction with possibly helping to increase awareness of the drought issue through testimonies included in this thesis. Farmers were always informed of the field study by Theo and Noah before arrival to limit any uneasiness. When relevant, village leaders were contacted to grant permission to conduct the study in their villages, which was considered a local custom.

When conducting fieldwork as a private researcher or as a representative of an aid agency, one often depends on what Swidler and Watkins (2017) call *brokers.* These brokers are

middlemen with local knowledge, providing information and contact with beneficiaries or target groups. Swidler and Watkins (2017, 19) explain that brokers have goals and interests they want to attain and that collaboration with a researcher or aid representative might create an opportunity to fulfill those. Intermediaries were required to reach informants to obtain relevant data. I was, of course, involved in finding informants, but ultimately it depended on the intermediaries to reach them. The intermediaries were crucial to the study, and our relationship mostly worked well. One challenge I faced was that one participant had been misinformed about the thesis by one of the intermediaries in a local language, giving the informant unrealistic expectations. I thus was cautious about potential hazards, working with brokers throughout the field study, and I always presented myself and the thesis again upon arrival to avoid misunderstandings.

Method and Source Criticism

Convenience and snowball sampling methods were chosen, being cost- and time-effective. However, they come with limitations. Both methods rely on connections, meaning the process may be biased and lack variety, resulting in a sample group not representative of the larger population. Although early on, clear patterns were detected in the data, confirming the information shared by KESSFF, which handles and represents hundreds of farmers nationwide. Additionally, using these sampling methods made it difficult to control the gender aspect. In practice, there were more men than women participating, 18 men and 6 women. It would have been ideal to have each gender make up 50 percent, and more women in the study could have highlighted the gendered consequences of drought. However, to focus on the gender dimension in addition to the presented research problem would have been too broad, as stated in the chapter on Delimitations.

This thesis focuses on the perspectives of small-scale farmers, and semi-structured interviews highlight personal experiences. Participants are therefore expected to describe their understanding of an issue. Ideally, informants recall their own first-hand experiences, making them primary sources. Information will be subjective, which is expected and welcomed. However, as drought is a significant problem affecting the farmers personally, testimonies may have been altered or exacerbated in the hope of being assisted financially or materially. Furthermore, community priorities and the habit of engaging with development projects may have influenced testimonies, and shared information may not necessarily reflect the

informant's experiences. For example, participants were well-informed about international relations and sometimes expressed themselves with terms used within aid. These problems were considered when using semi-structured interviews and during data analysis. Additionally, the coding scheme helped to assess if any information deviated from or contradicted the patterns detected in the data.

As discussed previously, the intermediaries' presence may have impacted participants, influencing the testimonies' authenticity. At the same time, their presence limited any hostility and tension that might have come up had I arrived at various locations without a person linking me to the community. As English is one of the main languages spoken in Kenya, almost all interviews were conducted in English. If the informant did not speak English, a translator would translate the interview into Swahili or a local language. The translator was either Theo, Noah, or one of the villagers. If the respondent was uncomfortable with English, their ability to express themselves could have been hindered, and vital information left out. However, a translator with connections to the informant or the area may also refrain from sharing aspects due to their interests or uncertainty of how messages would be perceived, which was taken into consideration when conducting the interviews. An independent translator can be brought in for future studies to avoid these problems.

The observations, as mentioned, were fully participatory and non-engaging. When actively engaging with the environment and people in the field, one may alter the natural state of the study context. However, observing from a distance may lead to assumptions that are not necessarily true. Both kinds were used to complement each other and compensate for weaknesses. Moreover, observations can lead to a confirmation bias where one searches for information that confirms one's perception or opinions. Self-awareness is therefore essential here, as discussed below.

Reflexivity

Self-reflexivity can be defined as *"a process of self-consciousness where an individual subject or group becomes the object of its own scrutiny"* (Oxford Reference n.d.) In this context, reflexivity calls for examining how my behaviors and motives affect the data collection process and analysis of the material. Danska Riksarkivet (2015) explains that the person receiving information may influence how it is presented. My educational background

and previous experience working in similar environments, e.g., as an NGO volunteer, may lead to preconceptions about informants and study contexts. It was, therefore, necessary to remind myself to be open-minded to learn anew in the field. Schensul and LeCompte (2013, 322) underline the importance of objectivity but also claim that researchers all carry subjectivity. Thus, much thought was put into the interview questions to limit my biased perceptions through leading questions. However, I may have revealed personal beliefs at moments through affirmative words or agreeing with participants. As drought is an issue that affects so many farmers, it was difficult to refrain from expressing my feelings when hearing upsetting stories. That is, of course, taken into consideration when analyzing the answers. All responses were matched with those of others to find discrepancies in the material. The coding scheme for data analysis facilitated a less subjective analysis as all responses went through the same process.

Furthermore, as so many aid agencies and NGOs are present in Narok and Nakuru, participants sometimes thought I had come to speak on solving the drought. It was thus a learning process to handle these expectations and how my presence may have influenced the informants. Therefore, establishing a relationship with participants was essential to correctly present the thesis and its purpose. According to Schensul and LeCompte (2013, 9), establishing relationships is key to effective fieldwork. However, as many informants are in a vulnerable position, it was essential to reflect on the power dynamics and how the relationship might affect the informants. Therefore, relations were founded in a friendly but professional manner. Theo and Noah were here helpful as they knew of the local setting, providing a natural connection between me and the informants.

5. Empirical Findings

This chapter presents the empirical findings of this thesis related to the two research questions. The chapter is divided into the various ways drought impacts small-scale farmers, the coping mechanisms used, and what is needed to implement strategies for adaptation and mitigation in terms of resources and governmental and international support.

5.1 Drought Impacts and Coping Mechanisms

Agricultural and Economic Impacts

Informants have witnessed a noticeable exacerbation in the current drought events. As less rain is coming and the rainy seasons arrive later than expected, it is tough for them to know when to start planting and to plan their farming activities.

"*The drought always comes and goes, but this one actually is very crazy, like Corona. It has increased. The wells are dry now. The dams have dried. The rains are not coming. There is no season for planting.*"

Adam (interview, 28-01-2023).

Farmers depend on rivers to give water to their crops, animals and to drink when there is no rain. However, rivers quickly dry up during the drought, and 33 percent of the informants explain that their only water source is gone. Stella, a tomato and chili farmer in Narok, describes how she uses the little water left in the rivers but has to watch as her crops die. Over 40 percent of the informants have had their crops die due to drought, resulting in no harvest. Even if few crops grow, 70 percent of the farmers experience low yields or struggle to keep their planted crops. According to Leila, a potato and maize farmer in Narok, the drought has increased pests that are difficult to manage.

As mentioned in the chapter on Method and Material, several farmers sell their produce. Fifty-four percent of informants, therefore, state that the drought has impacted them economically by lowering the agricultural output and the ability to earn income. John, a maize farmer in Nakuru, says there has been a decrease in the prices of maize, resulting in less income. Furthermore, Tara, also a maize farmer in Nakuru, explains that there is an imbalance in supply and demand and that access to the market is limited as there is sometimes nothing to sell. According to Stephen, who produces beans and potatoes in Nakuru, there is also an increased import of agricultural products from outside Kenya.

Not only is there a loss of income, but increased production costs. Costs are sometimes higher than the value of produce, says Tony, who rears cows and grows passionfruit in Nakuru. Three farmers claim that the increase in prices of fuel used to power machines and

water pumps has affected their ability to cope with drought. New kinds of costs have also emerged. Ben in Nakuru explains that he has to buy the vegetables he used to grow himself. Also, Henry, a potato farmer in Narok, has to buy potatoes. Tristan, a potato, bean, and maize farmer in Nakuru, claims that fighting the increased pests requires financial resources.

The economic impacts of drought affect farmers and their families, and 42 percent state that the low yield hinders them from providing for their families. In addition, two informants with children disclose that they struggle to send their children to school because paying tuition is difficult.

"I have nothing to give to my family, to give actually myself, so I am bankrupt. I do not have any money to give my people because I do not have anything I produce."

Simon (interview, 28-01-2023)

Stella is among the few farmers interviewed with employees. The drought has made it difficult for her to pay her workers, and she also has a loan she needs to pay back. Stella points out that small-scale farmers like herself sometimes have to sell their farms as they cannot pay the loans they have taken.

Impacts on Health and Well-being

The drought has resulted in food insecurity for the small-scale farmers in Narok and Nakuru, and 25 percent of informants report extreme food insecurity. Esther, a chili farmer in Narok, says that people in her community can no longer afford the foods they used to, resulting in a lack of nutrients in their diets. The risk of drinking unsafe water is significant as water is scarce. Neil, a flower farmer in Nakuru, explains that people in his community have been forced to consume contaminated water from puddles, which animals use.

The drought has created clear areas of responsibility within families and farming communities. The women always search for water while the men look for food. During the interview with Tristan and Neil, another farmer came through the farm entrance carrying two water containers on her bicycle. She dropped them off and left again to look for more. According to Tony, children also participate in the water search and are told to stay home from school, which impacts their education.

Fertilizers and pesticides are common, and 70 percent report they use or have used chemical fertilizers. The informants address the issue of using chemical fertilizers and pesticides during drought. The agent is supposed to be mixed with water during irrigation or rain. According to Stella, continued fertilizer use without water leads to crops drying up. Using chemical fertilizers during the drought in Narok and Nakuru poses health risks, explains Timothy, a maize and potato farmer in Narok. He says that people in his community are unaware of the hazards of contact with chemical agents. People ingest the produce sprayed with undissolved fertilizer, and it enters the few water sources.

Only two informants describe their situation as sustainable and have found measures to manage drought. The rest report that their situation now is unbearable. However, when asked, everyone believes farming will be sustainable in the future when implementing the proper mechanisms to cope and receive the right support. In the meantime, drought creates stress and anxiety for small-scale farmers as the future is uncertain, as Tony in Nakuru describes.

"This is a big challenge, it hinders development. I am wondering what will happen next. Shall I die? What happens to my children?"

Tony (interview, 15-02-2023)

Coping Mechanisms

This section presents the main mechanisms informants in Narok and Nakuru use to cope with drought. For a complete list of coping mechanisms, see Appendix B.

A primary coping mechanism is having other businesses, as used by 21 percent. Isabelle manages a potato farm in Narok and reveals that farming is not enough to generate an income for most people during the drought. She explains that poultry is popular as chickens require less water than other animals. Table banking (i.e., a funding system where a group collectively saves money for future borrowing) is another business farmers use to cope. Isabelle says that it can offer economic security for farmers in times of drought. Tomato and chili farmer Stella is a part-time teacher at a local school to earn extra income.

Most informants have changed their farming practices to cope, focusing on indigenous conservation agriculture (see Appendix B.), e.g., agroforestry and organic farming, as well as

minimal soil disturbance techniques, used by 21 percent. Isabelle uses a minimum tillage technique (i.e., no or low soil plowing) to preserve the soil and its insects to help her plants grow. Tara and John, maize farmers in Nakuru, use the minimum tillage technique to cope with drought. Tara digs small holes in the soil where she plants her seeds and explains that she is better off during this drought than the last since she started this practice. Tara says her coping with drought is noticeably better using conservation techniques. She was able to harvest ten sacks of potatoes compared to two sacks during the previous year. Although Tara has been able to increase her production, the drought is making farming unsustainable.

Tristan and Neil in Nakuru practice a minimum tillage technique called mulching, which entails covering the soil with sawdust or similar material to keep the soil cool and prevent weeds. Neil is a flower farmer, and when he plants roses, he plants white pepper beside them as he claims the pepper help preserve moisture in the soil. Tristan reveals that farmers not practicing conservation agriculture in his community have difficulty coping with drought. Tristan and Neil have also adapted their planting schedule and use short-term crops, which they sow during short rains. Usually, farmers wait for the long rainy seasons to plant, and the short rains that may come in between are not used. Planting during short rains helps 13 percent of informants to cope with drought.

"*We adopted conservation agriculture, and we increased our yields. Because the small water that is coming during the short rains is now useful when we use the new practices. The rate of evaporation is reduced because the water now infiltrates most of the soil.*"

Tristan (interview, 17-02-202).

Agroforestry is used by 21 percent of informants. Trees protect crops from direct sunlight and lower the water's evaporation rate in the soil, says Patrick, who grows maize in Nakuru. According to passionfruit farmer Tony in Nakuru, agroforestry can provide adaptation, mitigation, and increased production. Tony says the kind of tree one plants matters, calling the avocado tree a *"three-way tree."* It gives fruit to eat and sell and has environmental benefits as it binds carbon dioxide. Henry, growing potatoes in Narok, says planting trees will help combat the spread of arid and semi-arid regions. Chili farmer Esther grows trees in Narok, which she sees has several benefits.

"*I have also planted a lot of trees and I want these trees to be used for rehabilitation in the area. I will sell some for economic reasons. But I will also give a lot for free. Especially the desert varieties, especially acacia trees. I supply that for free just to try to increase the chance that we can get rain. It is a long process, but I am sure one day it will be worth it*."

Esther (interview, 26-01-2023)

Another coping mechanism that 21 percent of informants use is switching to organic fertilizers. Potato farmer Isabelle in Narok says organic fertilizers last longer than chemical ones as one needs less. She also explains that the chemical fertilizer weakens the soil, hindering her from producing good-quality products. Tara in Nakuru uses maize stocks that have dried up during the drought as animal feeds. The manure from her animals is then used as fertilizer for her plants.

Change of crops is another coping mechanism used in Narok and Nakuru. Change of crops can be both financially challenging and mentally exhausting but may be worthwhile as drought is unmanageable when continuing to produce poor-quality products unfit for the market, explains Tony. He will start growing dragonfruit as it requires little water and no fertilizer. Instead of completely switching the crops, one can practice crop rotation (i.e., growing several different crops in the same area throughout a season). Crop rotation is used by 30 percent of informants, and Stella in Narok claims it limits the soil's hollowing. Additionally, rotating and moving around as a farmer is also an option. Adrian, who rears cattle and grows maize and wheat in Narok, moves his farm around to find water and suitable land for his crops and animals.

Water harvesting and or irrigation systems are used by 25 percent. Farmers can have water even during dry periods by collecting rainwater during rainy seasons and storing it in tanks. Tony in Nakuru has water tanks and explains that they allow for installing irrigation systems when rivers are dry or when one has no access to a well or borehole. Nevertheless, Tony mentions that water is still a precondition and that the tanks only help when enough rain fills them up. Esther in Narok uses a drip irrigation system, which pumps out small amounts of water, using much less than other irrigation systems. For Stella in Narok, coping is a question of resources, and she explains her current watering system could be more sustainable as it wastes desperately needed water. She expresses that she has no alternative and must continue using it.

While some have been able to find measures to cope with drought, others have not. Simon, a cabbage and potato farmer in Narok, *"kibarua,"* meaning he just keeps hustling. Mia, who grows sweet potatoes and beans in Narok, says the only thing she can do is to *"pray, pray, pray."*

5.2 Needs for Implementing Adapting and Mitigating Strategies

The adapting and mitigating strategies that informants in Narok and Nakuru want to implement are practically the same as the coping mechanisms some farmers already use. For example, 58 percent believe agroforestry can help adapt to and mitigate drought, and 30 percent believe other conservation practices, such as minimum tillage techniques, can do that. Implementation depends on several different factors, which are presented in this section.

Information

Information is considered one of the primary needs for implementing adapting and mitigating strategies, as explained by 62 percent of informants. Tristan, a potato, bean, and maize farmer in Nakuru, reveals he tries to spread his knowledge on conservation agriculture and the connection to drought management. However, he says it is difficult as some farmers want to keep their farming methods the same. Stephen, a bean and potato farmer in Nakuru, explains that informing farmers about climate change is the first step and that information needs to be more accessible to those affected by drought. He pushes for a campaign to make people start planting trees. Information on the importance of mitigation needs to be prioritized, says Adrian, who grows maize, beans, and wheat in Narok.

"The farmers need information. Do not provide food for the stomach but food for the brain. If only the farmer knows what they are doing, then the world is well fed."

Tony (interview, 15-02-2023)

Kim, who grows maize in Narok, describes the issue of illiteracy as disastrous in the case of climate change adaptation and mitigation. People who do not go to school are unaware that climate change is the primary cause of the current situation and do not learn how to handle it in their farming. Kim argues that education is essential in learning adaptation and mitigation but also suggests that more research has to be conducted in his area. He would like to see

more small-scale farmers enrolled in agricultural programs. Max, a maize and bean farmer in Narok, underlines the importance of education and community groups for discussing adaptation and mitigation. Although some individual farmers are informed, the whole community needs to be involved in combating drought, and adequate information empowers small-scale farmers to change their situation, says Max. He reveals that collaboration between farmers and community-initiated training has successfully disseminated information on conservation practices.

Equipment

A lack of equipment limits the implementation of adapting and mitigating strategies. Farmers know that agroforestry is an adaptive strategy and provide mitigation in the long run and also that the kind of tree matters. According to Tony, who grows passionfruit and rears cows in Nakuru, the government has recognized the importance of trees in agriculture and has pushed for farmers to have no less than thirty trees each. However, farmers must be given seeds or seedlings to accomplish this, as it may be expensive to implement agroforestry, says Stephen in Nakuru. Timothy, a maize farmer in Nakuru, claims access to seeds for adopting crop rotation or switching to new kinds of crops is essential for effective adaptation.

Forty-two percent of informants express that they need suitable materials. Pumps and diesel generators can help pump water from rivers or homebuilt wells. They note that access to renewable energy sources, e.g., solar panels, to power farming equipment, can relieve economic stress. According to maize farmer Tara in Nakuru, it can also mitigate climate change and, thus, drought. Isabelle, a potato farmer in Narok, says she would benefit from a drip irrigation system but lacks the technical tools to establish one.

Farmers need water, and 67 percent would like boreholes for constant water access. A borehole can help farmers adapt to drought and may also facilitate the implementation of mitigating practices, but it is costly.

"The main problem, you can tell everyone, is water. What we need is water. The problem is not money; it is water. Then we can produce our own. The cost of water… When we go to the market to buy it, we cannot afford it."

Joakim (interview, 16-02-2023)

Finances and Market

Forty-two percent of informants report finances as an obstacle to handling drought and implementing adapting and mitigating strategies. Stephen in Nakuru argues that increasing the financial resources of small-scale farmers can enable them to implement conservation practices and afford greenhouses to grow crops regardless of climatic conditions. When asked about the price of a greenhouse, one farmer explained it would cost her 250 000 Kenyan Shillings (approximately 19 500 SEK with the current exchange rate). Peter, a potato and carrot farmer in Narok, believes *"money, millions of money"* is needed to implement adequate measures, such as boreholes and pumps.

Closely related to financial resources is the market. Stephen says there are few commodities to sell or that products on the market are of low quality, meaning the farmers get paid less. It also is difficult to access the market. The Secretary of *Kenya Small-Scale Farmers Forum* (KESSFF) explains that small-scale farmers need access to farmer-friendly credit and the market to conquer the effects of drought. The Secretary notes this is a governmental policy issue and emphasizes the need to increase small-scale farmers' capacities and participation in formulating policies.

Government

The government is a vital actor influencing small-scale farmers' capacity to implement adapting and mitigating strategies, and 71 percent of informants stress the need for government facilitation. The informants feel the government is responsible for assisting small-scale farmers in terms of material, funding, enabling policies, and information resources. Twenty-five percent of informants state that the government has provided them with chemical fertilizers, and two people explain that they have received seedlings.

The farmers want the government to fund the implementation of adapting and mitigating practices and drill boreholes. The government has had plans to initiate drought-combating projects in Nakuru. Joakim, who grows maize, beans, and fruits in Nakuru, explains there were plans to drill a borehole in his community and an irrigation project with a dam. He said government representatives came to take measurements, but the project was never followed through. Tony in Nakuru says that the implementation stage is where the government fails.

"The government knows that this place is a basket of fruit, which they could even export to other countries. But they are missing the priorities of implementation, building infrastructure for water harvesting. A farmer only needs two things: a reliable water source and a reliable market. Nothing else. (...) If the government fails, who do you cry for? Only god."

Tony (interview, 15-02-2023)

Tara in Nakuru believes it would help if the government collaborated with small-scale farmers and bought their products to keep their businesses running. In turn, more farmers can afford to implement adapting and mitigating strategies**.** Ben, who produces maize and beans in Nakuru, illustrates how policies hinder him from accessing water from the still water-filled rivers during drought. He explains that the government will interfere if he uses the water from the rivers, making it challenging to keep his only income source. Ben says that he would need permission to use the river water.

The Secretary of KESSFF argues that farmer participation in policy formulation is crucial to implement effective adaptation and mitigation. Potato, bean, and maize farmer Tristan in Nakuru supports this claim, who says that policies and projects should be initiated and formulated locally as the governmental level lacks accountability.

"Yes, everything at the local level. That is the best way, that is how you can achieve it [change]. When you come at a governmental level, they will just take you in circles. (...) Accountability is the key to every project."

Tristan (interview, 17-02-2023)

International Involvement

Due to the lack of governmental support, most farmers in Narok and Nakuru want the international community to assist them with drought. However, they share different experiences of the involvement of international actors in the drought issue. Flower farmer Neil in Nakuru describes that international actors can help disseminate information on implementing adaptation and mitigation but that farmers still need water. Several large development actors and NGOs have been implementing projects in Narok and Nakuru with varying results. For example, Henry, who grows potatoes in Narok, tells of a large aid agency that drilled a borehole in his area and compares the project to an aid-funded bridge connecting people and markets.

"Like we had a borehole that was real but (...) the borehole is really bad, it is not helping. They never put in all the pipes. Then we had a bridge that was built by a foreigner, and the bridge is helping thousands of people up to today.

Henry (interview, 28-01-2023),

The Secretary of KESSFF, explains that international policies are necessary to combat drought locally. However, despite the many international initiatives addressing the issue, he is disappointed in the lack of progress, saying, *"After 60 years, we should have been seeing change."* The KESSFF is a grassroots organization communicating with NGOs and aid agencies to place small-scale farmers at the center of global climate action. The Secretary reveals that the current aid system does not consider the local settings, which hinders the empowerment of local farmers and their ability to make their needs heard. Tony in Nakuru explains that a renowned international environmental organization has conducted trainings with farmers in his area. The lecturers are from the specific region and therefore know about the conditions shaping small-scale agriculture there. He says their projects always start with the farmer, providing helpful information and resources.

Henry in Narok says money from aid organizations sometimes never reaches the intended target group due to employing staff from outside the project area and because of corruption.

"They pick someone who is not from that area, they bring good stories of how it is going to help, but since the certain person (...) does not know the heat of the community, the money is going to be raised, but it will not end up reaching that community."

Henry (interview, 28-01-2023)

Employing "*outsiders,"* as Henry calls them, is what development actors do wrong. Henry believes the collaboration between government and international actors is important for functioning aid projects, but that money easily lands in the wrong hands. Therefore, donations directly to communities are needed to help properly implement adapting and mitigating strategies.

Neil in Nakuru stresses presence at project locations. He urges project directors to *"just come"* and be present to ensure the project is implemented correctly, reaches the intended farmers, and employs the farmers themselves to oversee the progress. Neil says that this

creates accountability. Lastly, he argues that guidelines are essential and should be set at the international and local level, e.g., ensuring water projects help implement mitigating measures and not allow the creation of a business out of aid-funded water.

The informants discuss deforestation, e.g., of the Mau Forest Complex, as a significant contributor to drought. Ben and Joakim in Nakuru highlight the complexity of international involvement and deforestation.

"Kenyans are running into the problems of climate change but we are not the source of it. (...) We need to plant more trees and the international community needs to push for this, to conserve our forests. The water kept in the water towers is not for the people of Kenya. It is drained for purposes far away."

Ben and Joakim (interview, 16-02-2023)

6. Analysis

This chapter analyzes the empirical findings. The analysis highlights and discusses central themes, drawing on the elements of Political Ecology.

Responses to Drought and its Effects

Drought impacts small-scale farmers in several ways, limiting food security and farmers' ability to earn income to provide for the family and impacting one's well-being. The effects of drought are also exacerbated by non-ecological factors such as lack of information, equipment, and market access. The informants explain how they now buy the products they usually produce and describe the need to address unfavorable markets. They depend on an unstable market where prices fluctuate, and handling drought creates a financial strain where new costs, e.g., increased fuel prices, affect coping capacity. Moreover, drought is a two-way problem in terms of education. It impacts children's opportunities to go to school, while education is said to be vital in learning the connection between climate change and drought and how to cope accordingly.

All informants in this thesis are affected by drought, but to a varying degree, depending on their ability to adopt effective coping mechanisms. Wezel et al. (2020) express that

diversification is essential for coping with climate change effects, and the farmers use livelihood diversification by taking on other businesses. Diversification is also prominent in informants' agricultural coping practices by planting new drought-resistant crops and incorporating several kinds of crops into their farming. Two farmers also move their animals and farms around, a practice native to the Masaai people (Western & Nightingale 2003). The coping mechanisms reflect the indigenous and local practices used in Kenyan agriculture, e.g., agroforestry and organic farming, promoting conservation (Muthee et al. 2019). The small-scale farmers recognize that humans and the environment can benefit from each other. For example, by not plowing, one preserves the natural balance in the soil and protects the insects, which enhances crop production. According to informants, indigenous conservational coping mechanisms better manage drought than conventional methods, such as chemical fertilizers. Using chemical fertilizer can be understood as a maladaptive coping mechanism as it increases the drought's negative effect on crops and is a health hazard.

Coping mechanisms used by the informants are primarily adaptive, as stated by Martinez-Baron et al. (2018), and help to manage better the conditions drought brings, e.g., through short-rain planting or community collaboration. Hoffman and Oliver-Smith (2002, 9-10) explain that disasters can strengthen unity, which may be the case in small-scale farming communities with drought. The informants express that participation in community groups and collaboration are meaningful for spreading information.

Many indigenous strategies come with mitigation co-benefits, e.g., low-plowing practices and crop rotation, alleviating drought for the individual farmer but not necessarily contributing to climate change mitigation globally. Nevertheless, informants stress the importance of including mitigation in drought-combating efforts on the local level, e.g., by providing solar panels. Laukkonen et al. (2009) claim that adapting and mitigating strategies may contradict one another. For example, lower fuel prices can help farmers adapt but increased use of fossil fuels comes at the expense of mitigation. However, one of the main coping mechanisms, agroforestry, is both adapting and mitigating. According to the informants, agroforestry can provide effective drought relief, increase income, and have long-term global environmental benefits, reducing GHG emissions. Agroforestry is the coping mechanism informants talked about the most and the strategy primarily discussed regarding adaptation and mitigation.

One depends on material, economic, and information resources to adopt coping mechanisms and implement adapting and mitigating strategies. The informants highlight the need for increased implementation of indigenous conservation practices and access to modern technology to establish irrigation systems and drill boreholes. They are open to learning new information and spreading their knowledge. That challenges the idea of separation between modern science and indigenous knowledge systems (Crewe & Axelby 2013, 151-152). The informants see the need for both in combination. However, most of all, the small-scale farmers need water, suggesting they can then solve other issues they encounter during drought. This thesis suggests that functioning networks are significant for farmers to attain water and implement adapting and mitigating strategies, as Martinez-Baron et al. (2018) claim. When they work, they can benefit small-scale farmers, e.g., by spreading information or building infrastructure. However, the results also highlight how power relations permeate these networks and that handling drought is a political struggle.

Lack of Support and Contradictory Government Actions

Vulnerability to drought and capacity to manage are affected by national politics (Benjaminsen & Svarstad 2018). Informants feel they are at the hands of the government to implement adapting and mitigating strategies. Some indigenous practices, although advantageous, are expensive. The government has, as mentioned, launched an initiative to plant trees to combat deforestation and mitigate climate change. However, the informants express they need more support to achieve this, as attaining tree seedlings can be financially draining. Providing small-scale farmers with seedlings to practice agroforestry can benefit the individual farmer and society as farmers participate in national and global GHG mitigation. However, the informants are currently expected to conform to policies without support. There is also a contradiction in the government's will to conserve the environment. As one informant said, policies are keeping him from using river water. The practices to preserve water performed by officials affect the local communities, much in line with the Mau Forest conservation attempt mentioned in the Background chapter, penalizing hundreds of people living on and cultivating the forest land. Additionally, the government subsidizes maladaptive chemical fertilizers instead of supporting indigenous organic practices, which help small-scale farmers cope with drought.

Corruption, difficulty in implementation, and lack of assistance characterize the farmer-government network on which small-scale farmers depend. The problem is further illustrated by the absence of county-level legislation on handling climate change, resulting in questions of who bears responsibility and how policies should be implemented (MoALF 2016). Chandra et al. (2016) claim that institutional capacity influences small-scale farmers' opportunities to contribute to adaptation and mitigation. The informants stress the potential in Narok and Nakuru to produce and that the government needs to harness this capacity by buying locally, providing credit and a favorable market. Nevertheless, small-scale farmers are instead competing with cheap maize imports from Uganda (AGRA 2021), underlining the disadvantageous environment they are in. That further highlights that there may be a need for more political influence for small-scale farmers to handle drought effectively.

The power of markets is also relevant in this case, as Benjaminsen and Svarstad (2018) elaborate on from a Political Ecological perspective. Based on modernization, mainstream development thinking drives small-scale farmers to join the global value chains, increasing production scale but lowering the number of people who can keep farming their livelihood (Benjaminsen & Svarstad 2021, 210). Crewe and Axelby (2013, 162-163) suggest that the market reflects hegemonic economic ideas. Pushing farmers to join a non-farmer-friendly market by opening up or through aid (see Previous Research and EU aid to Kenya) may thus benefit the most powerful interests. Benjaminsen and Svarstad (2018) illustrate this by claiming that climate vulnerability increased among Nigerian small-scale farmers when they depended on an unstable market.

International Involvement is Needed but Should be Problematized

The informants believe international actors have a role in combating drought in Narok and Nakuru, e.g., by pushing the government to take action. Informants also explain that NGOs provide valuable resources to facilitate drought adaptation and mitigation, as Chandra et al. (2016) note. Similarly, farmers in Bangladesh grappling with flooding benefited from NGOs providing equipment, seeds, and loans in combination with their indigenous coping mechanisms (Zaman 2019, 172). However, it is essential to note that international involvement has problems and raises questions about what purposes projects fill and the premises on which the relationship between farmers and these organizations is founded.

NGOs are referred to as "*knowledge brokers"* by Martinez-Baron et al. (2018). That confirms some of the testimonies as small-scale farmers see the need for international actors to disseminate information on handling drought or provide resources when there is know-how. Simultaneously, the informants claim that projects do not harness local expertise or consider contextual priorities, suggesting many NGOs in Narok and Nakuru push the Western development discourse where indigenous knowledge systems are excluded, and local settings are overlooked (Crewe & Axelby 2013). As the results show, implementing the proper techniques is essential, but so is the empowerment of small-scale farmers through participatory designs, increased accountability, and global policies that respond to climate injustices.

Easterly's (2006) perspective on *Planners* and *Searchers* (see Previous Research) is relevant to analyze regarding the findings on international projects. Actors using a Planner's standpoint could not implement successful projects in Narok and Nakuru. For example, the actor drilling a borehole without pipes can be compared to those *"outsiders,"* as one informant calls them, seeing development as technical and climate disasters as a "*technological fix,"* as discussed by Zaman (2019, 171). In contrast, actors who had a Searcher's perspective and employed community members, were present at the site and considered local knowledge made a difference for small-scale farmers in Narok and Nakuru. The bridge built by an aid agency in Narok may indirectly facilitate adaptation and mitigation by creating opportunities to reach new markets, generate income, and fund practices such as agroforestry.

Regarding Easterly's approach, it is noteworthy that applying a Searcher's perspective to promote local solutions to local problems relies on local actors to address an issue, mobilize and take action. That may require personal capacity, resources, and a space to make one's voice heard, which cannot be taken for granted. Most small-scale farmers witnessed that they were ready to take action and involve themselves in projects but needed recognition.

Crewe and Axelby (2013, 76) explain that community-owned projects perform better than NGO-initiated ones, as confirmed by the informants. Externally owned projects also struggle to reach the poorest (Crewe & Axelby 2013, 76) or, in the case of Narok and Nakuru, those most affected by drought. Why are then so many projects still designed in a Planner's way? Crewe and Axelby (2013, 55) state that Western aid is justified by its contribution to national

interests. That can be understood as *Development Diplomacy,* where states use aid to advance their international relationships (Zielińska 2016, 12). Development practices come with moral, economic, and political incentives also for non-state actors, highlighted by the Secretary of KESSFF who describes NGOs as either *"Next Government Officer"* or *"Nothing Going On,"* meaning they collaborate closely with the state or are present in the country out of own interest and not for achieving meaningful progress. That relates to development as politics, where aid is not neutral but a strategic intervention to pursue a goal (Crewe & Axelby 2013, 3). The borehole without pipes is a successful project on paper and can lead to more funding, but it does nothing for the community in combating drought.

Addressing Who Should Provide Support, Participation, and Representation

According to Crewe and Axelby (2013, 43), anthropologist David Mosse claims that specific development policies should be examined in the context in which they are formed and implemented. Mosse (2013) recognizes that the number of public-private partnerships (PPP) in development is increasing and that aid is a business opportunity. International actors in Narok and Nakuru may benefit the state economically as it is a development partner (Crewe and Axelby 2013, 74). The informants highlight that a collaboration between the state and international actors may be valuable for implementing adapting and mitigating strategies. Collaboration between various actors characterizes environmental governance today, intensifying the complexity of climate change action globally and locally (Hogl et al. 2012, 3-6). Drought occurs locally, but the informants see it as an international issue, as they urge actors outside Kenya to assist financially, materially, and in forming national policies. However, conflicting interests may stall effective efforts (Hogl et al. 2012, 5). For example, due to the corruption, some informants say projects should cut the state as a middleman and be implemented directly at the local level.

Crewe & Axelby (2013, 75**)** discuss the development trend of bypassing the state. Aid governance has moved from the national to the international level, where NGOs replace the state (Crewe & Axelby 2013, 75). The small-scale farmers explain that the government cannot provide the needed support. That can give room for international actors to take on the responsibilities of the state. Decentralization may be needed to redistribute power and implement adequate strategies (Mansuri & Rao 2004). However, this stresses the need to address the potential tension in government-NGO networks, power relations in the

farmer-NGO network, and the issue of participatory decision-making to hold organizations accountable. Tallberg and Uhlin (2011) state that NGOs should ensure accountability toward stakeholders in line with the informants' testimonies and not just accountability toward donors. Crewe and Axelby (2013, 11) note that language that pushes *local participation*, *empowerment*, et cetera, is trending in development. However, Mansuri and Rao (2004) argue that external agendas may be disguised as local interests. As informants say, active participation in all stages of international projects is crucial to implement initiatives that small-scale agricultural communities want and need. That will assist them in coping with drought and implementing adapting and mitigating strategies.

Moreover, representation is relevant to discuss regarding the thesis' findings, addressing the notion of Western knowledge systems as superior. The informants mainly mention large Western organizations and a few local initiatives in their testimonies. Tallberg and Uhlin (2011) claim that participation and representation are both important. Western actors dominating the development scene in Narok and Nakuru may not challenge the unequal power relations or facilitate bringing local perspectives to the forefront to help farmers adapt to and mitigate drought. Crewe and Axelby (2013, 11) note that international organizations may not even have the power to *"transform radically the structural inequalities."* Similarly, research on climate change in Africa is predominantly conducted outside the continent in Western countries, which often overlooks local priorities (Trisos et al. 2022, 1289). According to the informants, there is a need to conduct agricultural research in Narok and Nakuru. That is a legitimate need if research and project designs on adaptation and mitigation are to represent the conditions small-scale farmers experience in those counties.

Finally, the informants argue that climate change injustice must be addressed internationally. As Laukkonen et al. (2009) state, mitigation is primarily a national and international issue; small-scale farmers need such actors to recognize their role in the deforestation of Kenya's water towers, such as the Mau Forest Complex. Staal et al. (2020) claim that deforestation is one of the main causes of drought and that drought itself causes deforestation, underlining the importance of addressing the issue. The Kenyan people are paying for international interests, creating a vicious circle. The state tries to combat deforestation by evicting local communities (Human Rights Watch 2019) and enforcing policies with which small-scale farmers struggle to comply. Simultaneously, informants see agroforestry as a solution to drought and deforestation but stand without proper support. It is counterintuitive for

international actors to use forest resources, contributing to climate change, while implementing projects to assist farmers in adapting to drought and facilitating local mitigation strategies, such as tree planting. That relates to the idea of proper environmental behavior often pushed by development actors, addressed within Political Ecology (Benjaminsen & Svarstad 2018). Furthermore, it underlines the complexity of environmental governance as small-scale farmers depend on national and international actors to take responsibility and combat drought.

7. Conclusion

This thesis examined drought impacts, coping mechanisms, and needs for implementing adapting and mitigating strategies from the perspective of small-scale farmers in the Kenyan counties of Narok and Nakuru. The ambition was to pay attention to indigenous and local knowledge and perspectives when studying activities on climate action and solutions to drought from a societal and research standpoint.

This thesis aimed to investigate the following questions: 1. How does drought affect small-scale farmers in Narok and Nakuru counties, and what coping mechanisms do they use? 2. According to small-scale farmers, what is needed to implement adapting and mitigating strategies? The results are based on an ethnographic field study examining the cases of Narok County and Nakuru County. The data was collected through the qualitative methods of observations and semi-structured interviews.

Drought affects small-scale farmers in Narok and Nakuru agriculturally as yield decreases; economically as there is a loss of income and increased costs; and in terms of well-being, as educational prospects decrease, anxiety increase, and food insecurity and water scarcity impact one's health. The small-scale farmers primarily use indigenous farming practices to cope with drought, such as agroforestry, low soil disturbance techniques, crop rotation, and organic fertilizing products such as manure. The farmers also take on other businesses as a coping mechanism, such as teaching and rearing poultry. In addition, some farmers use more modern farming equipment to cope, such as conventional drip irrigation systems and water tanks.

To implement adapting and mitigating strategies, farmers need the correct information and opportunities to access it through education, community groups, and trainings. Secondly, the farmers need access to proper equipment, materials, and water. Thirdly, sufficient financial resources and farmer-friendly markets are needed. Fourthly, the farmers need accountable government support and enabling policies where farmers themselves are involved in formulation. Lastly, international involvement may be needed to push these institutional changes. International actors are also needed to access economic, material, and information resources. Projects should be adapted to and represent the target group, harness indigenous knowledge, be locally connected, and actively involve small-scale farmers in all stages. There are still questions about achieving this best as many actors are involved in drought in Narok and Nakuru. Furthermore, implementing adapting and mitigating strategies depends on beneficial networks at local, national, and international levels. However, this proved difficult as political and economic interests and development trends shape international and governmental actions, enforcing unequal power relations, justifying contradictory behaviors, and hindering substantial change. Finally, drought is acutely affecting small-scale farmers, but it is clear that they know what they want and need to adapt to and mitigate it, and so much can be done to assist them.

8. Future Interventions

This thesis relates to and confirms existing research findings. However, it also complements current research by presenting in-depth the perspective of small-scale farmers and responses to drought, adaptation, and mitigation. Further investigating the initial implications of this thesis can provide starting points for new research and contribute to an exchange between conventional development perspectives, agricultural practices, and indigenous knowledge. Future interventions may examine how drought affects one specific gender of small-scale farmers. That would assumingly highlight new aspects and challenges not uncovered in this paper. Also, ethnic dimensions could be relevant to explore further as coping mechanisms can be linked to ethnic knowledge systems and traditions, which this thesis only touched on. Moreover, it could be interesting to study the dynamic between governmental and international actors in-depth, as they both hold a crucial role in implementing adapting and mitigating strategies. For example, follow a project from plan to implementation and study how small-scale farmers are involved in each stage.

Suppose this particular study was to be done again. In that case, the same qualitative methods can be used as they provided an in-depth exploration of the research questions as hoped. However, a decrease in informants is appropriate as so much data was collected. Thus, some interesting findings, e.g., on carbon credits, did not make it into this thesis. Therefore, a Political Ecological approach concerning opinions on carbon credits in small-scale farming communities could be a topic for a forthcoming paper.

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Appendix

Appendix A. Interview Questions

General

What is your name?

Where do you live?

How long have you been farming?

What do you farm?

What kind of farming do you practice? For yourself, selling, etc.

What are your thoughts on climate change?

Drought impacts

How would you describe the drought situation right now?

Has drought impacted your farming? If so, how?

What challenges do you see as a result?

Coping mechanisms

Have you implemented any measures to cope with drought? If so, what?

What happened when you implemented these measures? Have they worked as you had hoped?

Have you changed any of your farming practices to cope with drought? If so, how?

Adaptation and mitigation

Is there anything you would like to have or do to adapt to the effect of drought on your farming?

Is there anything you would like to have or do to mitigate the effect of drought on your farming?

Are there any obstacles to achieving these things?

Do you think there are ways to stop drought? If so, what solutions do you see?

Other

Would you like to add anything?

Appendix B. Coping Mechanisms

Table 1. The various drought coping mechanisms found among small-scale farmers in the counties of Narok and Nakuru and the percentage of how many use them.

Coping mechanism	Percentage of informants who use it
Practice crop rotation	30 %
Have other business	21 %
Use techniques for minimal soil disturbance	21 %
Use organic fertilizer instead of chemical ones	21 %
Use drip irrigation	21 %
Practice agroforestry	21 %
Use drought-resistant seeds or seeds more suitable for the area of the farm	17 %
Adopt general conservation practices	17 %
Use terracing	13 %
Use tanks to hold water	13 %
Plant during short rains	13 %
Reduce the size of the farm/ reduce the number of animals	8 %
Practice water harvesting	8 %
Use own well or borehole	8 %
Cooperate with other farmers in the community	8 %
Do soil testing	8 %
Move around / move for good	8 %
Keep crops out of direct sunlight	4 %