Climate Resilience and Migration among Maasai Pastoralists in Laikipia County, Kenya

A Qualitative Case Study

Jan Philipp Berndt

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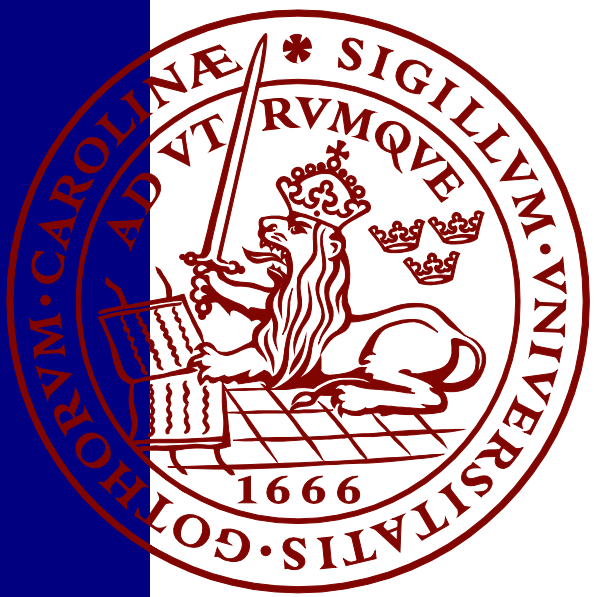

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Submitted May 13, 2025

Supervisor: Kimberly Nicholas, LUCSUS, Lund University

Abstract

This study investigates climate resilience and migration among Maasai pastoralists in Laikipia County, Kenya, addressing the urgent challenges posed by climate change to ecosystem-dependent livelihoods. Despite growing interest, qualitative studies linking climate impacts to human mobility outcomes among pastoralist communities remain limited. Drawing on climate resilience theory and climate-induced mobility concepts, the research used qualitative methods, conducting 18 semi-structured interviews with Maasai pastoralists in Laikipia North and applying deductive and thematic coding. Findings show that drought is the major perceived vulnerability. Adaptation strategies are centred on water access, livelihood diversification, and livestock management and are broadly known and implemented. Vulnerability increases migration aspirations but weakens capabilities, while adaptation has the opposite effect. The study concludes that climate change exacerbates existing hardship imposed by deeper structural factors, such as land tenure and governance legacies. Strengthening local democratic processes is essential to ensure adaptation pathways remain inclusive and safeguard traditional pastoralist livelihoods.

Keywords: Climate Resilience, Migration, Aspirations-capabilities-framework, Semi-structured interviews, Pastoralism, Laikipia

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1 Introduction

1.1 Climate-induced mobility

Climate change threatens the existence of livelihoods around the globe (Calvin et al., 2023). Through exacerbating climate impacts reaching from sea level rise to droughts and flash floods, vulnerable areas experience a temporary or even total loss of livelihoods – with increased human migration and displacement as the result (Hermans & McLeman, 2021; Rigaud et al., 2018; Van Loon et al., 2024). As reported by the Internal Displacement Monitoring Centre (IDMC), 20.3 million people were internally displaced due to extreme weather events by the end of 2023, globally (IDMC, 2024). This phenomenon of climate-induced mobility is expected to increase dramatically towards the middle of the century, reaching 261 million climate migrants in 2050 (Bettini & Gioli, 2016; Clement et al., 2021; Rigaud et al., 2018). A loss of livelihood occurs when "climate change adaptation [is] inadequate […] and some adverse impacts cannot be avoided" (Szaboova et al., 2025). The ability to withstand and adapt to climate impacts is widely referred to as climate resilience (Adger, 2000; Folke, 2016; Werners et al., 2021). Thus, decisive efforts to build climate resilience can contribute to sustain livelihoods and enable communities to make deliberate adaptation choices, whether to make staying viable or, as a last resort, to undertake planned relocation (Almulhim et al., 2024; Vinke et al., 2020).

1.2 Pastoral climate vulnerability in Kenya

Especially in countries with high vulnerability, there is significant pressure to adapt to climate change. Kenya is one of these countries, ranking high on the vulnerability scale (52nd most vulnerable country) and low on the readiness scale (146th least ready country) of the ND-GAIN Index (ND-GAIN, 2022). Floods and drought led to 1.3 million internal displacements in the country between 2020 and 2023, according to the latest IDMC data (IDMC, 2023). Especially arid and semi-arid lands (ASALs) which cover more than 80% of Kenya's land area "are often vulnerable to climate change because they are already climatically stressed with high temperatures, low rainfall, and long dry seasons" (Leal Filho et al., 2017, p. 72).

On these lands, pastoralism forms the dominant livelihood as agriculture is only viable in limited areas, however green pasture for animals to feed on is seasonally available (Little, 2015; Nyariki & Amwata, 2019). Pastoralism is an over 10,000 year-old nomadic or semi-nomadic subsistence practice (Galaty, 2021) defined as an "economic and cultural livelihood system that involves mobile livestock management in rangelands using […] traditional knowledge, skills and experience" (Wafula et al., 2022, p. 1). Seasonal livestock migration is designed to ensure access to pasture and water for the animals (Homewood et al., 2006). In a semi-nomadic setting, the family members, usually men, migrate their livestock during dry season in search for undegraded grasslands while they return to their community

and permanent homestead with their herds with the beginning of the rainy season (Håkansson, 2022). Typically, cattle, goats, sheep, or camels are herded, with specific flock management practices in place to regulate herd size and to manage breed diversification (Bobadoye et al., 2016; Leal Filho et al., 2017).

Due to its strong dependency on rain-fed pasture lands and intact ecological conditions, this economically and traditionally important lifestyle is disproportionately affected by climate change (Hermans & McLeman, 2021; Leal Filho et al., 2017; Nyariki & Amwata, 2019). In recent years, failing rains have increasingly led to droughts, increasing land degradation which ultimately "has adverse effects on resource-dependent rural populations and can potentially lead to livelihood losses and subsequent migration out of affected areas" (Hermans & McLeman, 2021, p. 236). Subsequent impoverishment (Wafula et al., 2022) and food insecurities lead to conflict and displacement (Adil et al., 2025). With intensifying climate impacts on the horizon, pastoralism faces existential challenges presently and in the future.

1.3 Laikipia under pressure

Particularly in Kenya's semi-arid Laikipia County where 80% of the population depend on livestock farming, pastoralists of the ethnic group of the Maasai suffer under worsening climate change (Leal Filho et al., 2017; Witt et al., 2020). Against this inherent vulnerability to climate impacts, there are efforts to adapt to the changing climate and to protect the traditional way of life of the Maasai, for example through sustainable water and livestock management (Bobadoye et al., 2016; Jane et al., 2013). However, studies show that, especially among pastoralists, there is frequent migration to cities and thus an abandoning of ancestral lands and traditional livelihoods. The reasons cited are conflicts as well as unbearable droughts – a problem closely intertwined with drought-induced resource scarcity and food insecurity (Adil et al., 2025; Njiru, 2012; Tubi & Israeli, 2024; Wafula et al., 2022).

In addition to climate impacts, Laikipian pastoralists are legally confined in accessing ancestral grazing grounds which severely restricts traditional migration strategies to cope with drought (Wanjiku et al., 2023). Colonial land tenure rights, especially the vast areas allocated to private ranches largely owned by Europeans or Kenyans of European descent, further increase the pressure on Maasai communities to sustain their livestock (Letai & Lind, 2013; Ndiritu, 2021). The fight for pasture under unresolved colonial land ownership fuelled by climate change has turned Laikipia into a "battleground" (Fox, 2018, p. 473) with profound implications on permanent migration and displacement.

1.4 Research gap and research questions

In addition to these pressing challenges, scholars identified a gap in researching pastoralist adaptation strategies in Laikipia, specifically, and linking climate vulnerability and adaptation to migration outcomes (Almulhim et al., 2024; Ndiritu, 2021). Moreover, Mayer et al. (2023) states that "it is not yet

understood how increased climate resilience would influence individual migration aspirations and capabilities" (p.68). There is also a shortcoming of studies that analyse the performance of democratic elements in the implementation process of climate policies in Laikipia. This is problematic, as impactful climate adaptation strategies rely on place-based compatibility and acceptance, both meaningfully increased through democratic participation (Greene, 2023; Olsson, 2022; Simonsen et al., 2012).

As climate change progresses, conflicts and migration could increase, threatening the existence of traditional Maasai livelihoods in Laikipia. For this reason, the aim of this study is to examine both the influence of climate change and the effect of adaptation measures as potential migration drivers and to evaluate the performance of local democracy to contribute to targeted climate policies. Against this background, the following research questions arise:

a.) How do Maasai pastoralists in Laikipia perceive climate change-induced vulnerabilities and climate adaptation measures?
b.) How do perceptions of vulnerability and adaptation influence personal aspirations and capabilities to permanently migrate?
c.) How do individuals perceive the performance of local democracy in shaping climate policies?

1.5 Thesis road map

To answer these questions, this study will revisit climate resilience and migration theory in chapter two to shed a light on relevant concepts such as climate vulnerability and adaptation as well as migration aspiration and capabilities, respectively. Based on this, the methodology for 18 semi-structured interviews conducted in Maasai communities in Laikipia will be presented. After presenting the findings in chapter four, this work proceeds with contextualising and discussing the results as well as elaborating on further research and limitations. Subsequently, the thesis closes with brief conclusion.

2 The Relation of Climate Resilience and Migration in Theory

This theory chapter defines and contextualizes how climate resilience and migration theory is used as the theoretical background for the applied methods of this thesis as well as to allow for an adequate interpretation of the results and to provide an orientation point when discussing the findings.

2.1 Climate resilience theory

The term "resilience" stems from the Latin word (resilire) and means "to bounce back" (Alexander, 2013). Early works by Holling (1973) in the field of ecology provided the foundation for its current understanding in sustainability science that was significantly influenced by the works of Neil Adger (2000) and Carl Folke (2016). With Folke defining resilience specifically in the context of social-ecological systems (SES), this work adopts his definition of resilience as "the capacity to adapt or

transform in the face of change in social ecological systems, particularly unexpected change, in ways that continue to support human well-being" (Folke et al., 2016, p. 2). The concept of social-ecological systems emphasises the interdependent feedback relationships between human societies and ecological processes and highlights its dependence on ecosystems (Bhattachan et al., 2018; J. Fischer et al., 2015). In the context of climate change, *climate-resilient development* is predominantly used to describe a social-ecological system's ability to withstand natural disasters or slow-onset climate events without collapsing and to recover from their impacts. Ideally, it also involves adapting to future disturbances of a similar nature while contributing to the mitigation of climate change as the root cause of such events (IPCC, 2022a; Sánchez Rodríguez & Fernández Carril, 2024).

2.1.1 Vulnerability as part of the risk nexus

Logically, resilience can only be viewed in relation to something – in the case of climate resilience against the *risk* of slow onset climate events like temperature increase or biodiversity loss, or rapid onset disasters like flash floods or heat waves (IDMC, 2018; UNFCCC, 2012). According to the IPCC, risk is a product of three components: *vulnerability* against climate impacts, *hazards* of climate change-induced events, and *exposure* to the impact of these events (IPCC, 2022b).

Vulnerability is defined as the "propensity or predisposition to be adversely affected and encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm and lack of capacity to cope and adapt" (IPCC, 2022a, p. 5). The concepts of resilience and vulnerability have a synergistic relationship as a vulnerability leads to a lack of resilience (Abeling et al., 2018). Thus, the concept vulnerability helps to identify weaknesses of the analysed system. *Adaptation* increases resilience by addressing these weaknesses and thereby reducing the overall risk (Abeling et al., 2018).

2.1.2 Increased resilience through climate adaptation

Adaptation measures depend on *adaptive capacity* which "includes assets (financial, physical, and/or ecological), capital (social and institutional), knowledge and technical know-how" (IPCC, 2022b, p. 88). While a high level of adaptive capacity can enhance the potential for adaptation, it does not automatically lead to effective action if factors such as awareness, willingness, or necessary cooperation are missing. Moreover, adaptation is constrained by various limits, which may be physical, ecological, technological, economic, political, institutional, psychological, or socio-cultural in nature (IPCC, 2022b). Adaptation types can be differentiated into place-based adaptation with the aim to stay (reducing exposure e.g.) or migratory adaptation with the aim to retreat from a place due to climate-changed induced inhabitability (Bettini & Gioli, 2016; Pemberton et al., 2021; Vinke et al., 2020). It is possible to deploy both approaches simultaneously, like building dams against flash floods and migrating seasonally in search of work.

In contrast to adaptation, *coping* describes "short term, reactive efforts enacted quickly to ward off immediate impacts" (A. P. Fischer, 2019, p. 160) while adaptation "involves changes that allow a community or a system to live with changing environmental conditions in the medium and long term" (Birkmann, 2011, p. 814). Certain short-term coping strategies may even seem beneficial for adaptation at first, but they can ultimately lead to maladaptive outcomes over time (Pemberton et al., 2021).

2.1.3 Diversification as climate adaptation

Diversification is part of the first principle of the *seven principles of resilience*[1]*,* to *maintain diversity and redundancy* (Kotschy et al., 2015). Beyond ecosystems, diversification is also applied in the broader context of climate resilience in which the diversification of income sources for individuals and communities plays a vital role in increasing both the adaptive and absorptive capacity to climate impacts (Do, 2023; Wuepper et al., 2018). A livelihood that relies solely on one source of income, e.g. cattle herding, is highly vulnerable as the loss of this source cannot be compensated by alternative income sources (Herrero et al., 2016). By providing alternatives and replicating system elements (redundancy), the diversification of livelihoods increases adaptive capacity and resilience (Baird et al., 2024; Kotschy et al., 2015).

2.1.4 The normative aspects of climate resilience

While debates continue over the coherence of resilience as an interdisciplinary concept in sustainability science, this subchapter focuses on a different discussion: its normativity (Cañizares-Gaztelu, 2023; Cote & Nightingale, 2012; Thorén & Olsson, 2018). Efforts to strive for climate resilience might strengthen systems that deliberately perpetuate unjust societal relationships or environmental degradation (Kotschy et al., 2015). It is a fundamental problem of the term resilience that it's being widely used in a positively connotated way, even though resilience itself is neutral as it simply describes a system's ability to withstand and adapt to change. Whether the change faced by the system is "good" or "bad" is always subject to normative judgement by stakeholders. This shows that when applying the concept of resilience in a social sciences context, it is vital to acknowledge this normativity and to ask for power dynamics and cultural contexts by posing the famous questions asked by Cote and Nightingale (2012): Resilience of what and for whom?

2.1.5 Democracy as a normative component of resilience

Inevitably, decisions about resilience for what and whom need to be made when it comes to investing time and resource into resilience building, e.g. through adaptation measures (Siders, 2022). Who are

[1] The seven principles of resilience are a widely recognised set of guidelines developed to synthesise key social and ecological factors that enhance the resilience of social-ecological systems. They were formulated to provide a clearer, more practical understanding of what supports system resilience and how these insights can be applied in diverse contexts (Biggs et al., 2012).

the people that profit from these investments that will affect their well-being under progressing climate change? What about economically neglected areas where profit-oriented investors might deter from providing financial capital? Which social classes or locations will be prioritised when it comes to distribution issues? The state will play a decisive role in these decisions which will have a direct impact on citizens. Democratic principles demand participation, the protection of human rights, transparency, an equitable and just decision-making process and representation of all citizens (Greene, 2023; Uittenbroek et al., 2019).

These questions are on the edge of sustainability science, but inseparably connected to vital questions of justice and accountability (Olsson, 2022). One might criticise that democratic values are derived from ethical arguments and thereby purely normative. However, it is a necessity to acknowledge that decisions around resilience building are inevitably normative and that, in the case of this work, the Republic of Kenya is committed to democratic values, which, in turn, justifies the application of a democratic-oriented research lens. This argumentation is aligned to the aforementioned *seven principles of resilience* through principle six, to *broaden participation*, and principle seven, to *promote polycentric governance* (Kotschy et al., 2015).

2.2 Migration

Human mobility is defined by the IOM as a "generic term covering all the different forms of movements of persons" (Sironi et al., 2019, p. 93). Migration is therefore a sub-term of mobility and is defined as the "movement of persons away from their place of usual residence, either across an international border or within a State" (Sironi et al., 2019, p. 137). While there are specifications of migration (internal/cross-border, permanent/seasonal), the element of migrants *moving away from their usual place of residence* is central.

2.2.1 Forced migration

Forced migration is a type of migration that is often used interchangeably with *forced displacement,* though some scholars distinguish the former as a subset of the latter (Erdal, 2020; Owen, 2024; Verme & Schuettler, 2021). As a theoretical deep dive into this debate does not align with the focus of this study, forced displacement is used throughout. Forced displacement is widely recognised as a tangible and observable phenomenon of human mobility in which people have to move away from their place of residency either permanently or temporarily in situations of violent conflict, natural disasters, or the gradual impacts of climate change (Erdal, 2020). Whereas regular migration has some degree of voluntariness and planning, forced displacement is characterised by coercion to leave for people who did not plan to (Owen, 2024). In contrast, 'trapped' populations refer to a total loss of agency over mobility decisions in vulnerable areas (Sironi et al., 2019).

2.2.2 Aspirations-Capabilities-Framework

When it comes to exploring and analysing reasons for migration, Hein de Haas provides an applicable concept that allows for a nuanced understanding of migration in the social-ecological and economical system that it is happening in. De Haas's aspirations-capabilities framework overcomes what he identifies as outdated and simplistic approaches for the explanation of migration phenomena, mainly the functionalist push-pull-factor model that solely bases migration decisions on economic incentives and is "not able to explain migration as a social process" (de Haas, 2021, p. 6).

Aspirations are defined as a mix of "people's general life aspirations and perceived geographical opportunity structures" (de Haas, 2021, p. 17). In the context of migration, the aspiration of individuals to migrate is influenced by culture, education, character and physical characteristics, identification, information and the influence of media and the environment (de Haas, 2021). Instrumental aspirations refer to functional aspects of migration aimed at improving income, for example when a family member migrates in search of work and sends remittances back home as part of a broader household strategy for income diversification and risk management. In the case of climate-induced migration, it's an aspiration to improve the environmental conditions that support a livelihood. Notably, place-attachment, belonging, or feelings of responsibility can also lead to aspirations to stay and therefore reduce aspiration to migrate – a phenomenon which de Haas calls the "'home preference'" (de Haas, 2021, p. 21).

Capabilities, according to de Haas, can be understood as the physical ability to move, consisting of positive freedoms such as financial means to travel and negative freedoms such as the absence of jurisdictional barriers that do not permit movement (de Haas, 2021). De Haas, along with other scholars in the field, emphasises that the academic concept of migration must always include the option to stay as it is part of human mobility and every human has the freedom to decide not to move (de Haas, 2021; Pemberton et al., 2021).

2.3 Climate-induced mobility

The concept of *climate-induced mobility* causally links climate resilience with migration and makes their interdependence visible. Climate-induced mobility comprises displacement, migration, and im/mobility of persons after disasters or slow-onset climate events and is a specific type of migration where movement or staying reasons, voluntary or involuntary, are related to environmental changes due to climate change (Bettini & Gioli, 2016; Guedes et al., 2024). With this broader understanding of mobility, climate-induced mobility leaves the narrow and outdated term of *climate migrant* behind (Almulhim et al., 2024; Boas et al., 2022). This step allows for a deeper understanding of "why people decide to move, how and where, or why people decide to stay" (Boas et al., 2022, p. 3369).

This analytical perspective aligns well with de Haas's aspiration-capability framework and allows for a more holistic understanding of how climate change affects migration and mobility in general (Parsons, 2019). At the same time, climate-induced stressors that trigger mobility reactions can be analysed through the presented concept of resilience as its components of risk and adaptation enable an understanding of how individuals perceive climate impacts. Another advantage of the concept of climate-induced mobility is its applicability on an individual level, meaning that individual experiences and views can be made visible (Parsons & Nielsen, 2021).

3 Methodology

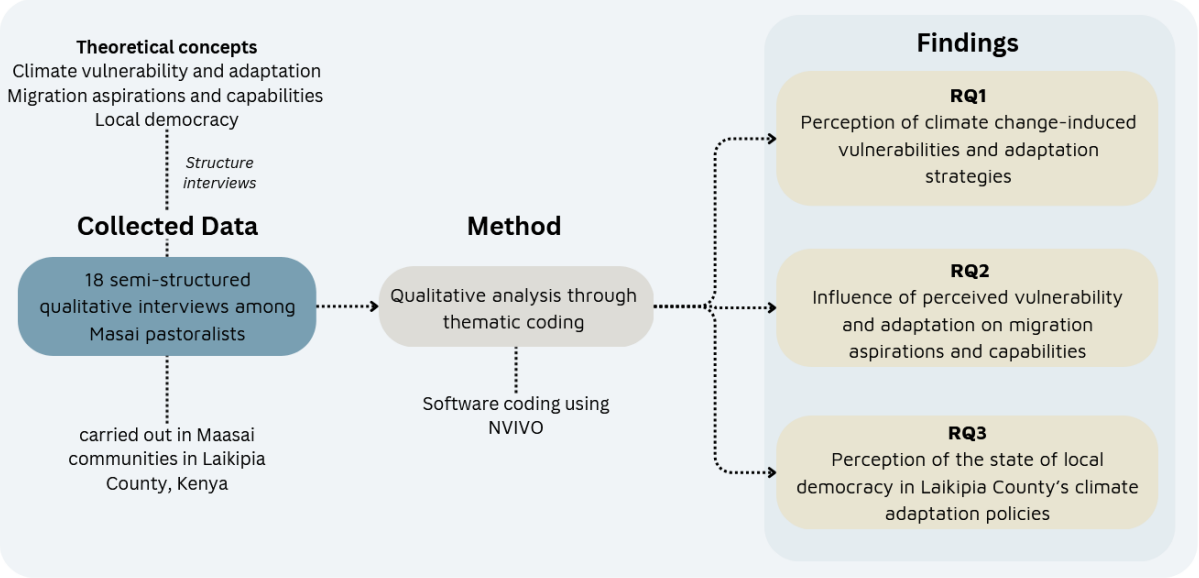


Figure 1. Research design. Visualisation of the research design to answer the three research questions. Own figure.

3.1 Research framework and method

This research conducts a qualitative single case study in Laikipia County, Kenya, for its prevalence of pastoralism under climate change impacts (Yin, 2014). The applied research framework consists of three components. The first two are climate resilience indicators and de Haas's aspiration-capabilities framework on migration, reflecting the concept of climate-induced migration. The advantage of this combination is a focus on climate change related migration factors, namely perceived climate vulnerability and adaptation as migration drivers, while being able to differentiate into two dimensions that construct migration decisions. The third component of the research framework consists of an assessment of the perceived state of local democracy to derive findings on how democratic elements shape climate policies.

As presented in the previous chapter, migration is to be seen as a personal mobility option that results from the individual's perception of the environment and social norms and contexts. Thus, individual

persons are the characteristic carriers of the variables this research seeks to analyse. All three research questions aim to measure variables that relate to a.) the personal perception of empirical phenomena, but also b.) personal hopes, feelings, and thoughts, in other words, variables that are only brought into the world by the individual themself. Consequently, interviewing individuals is the most suitable method to capture these variables.

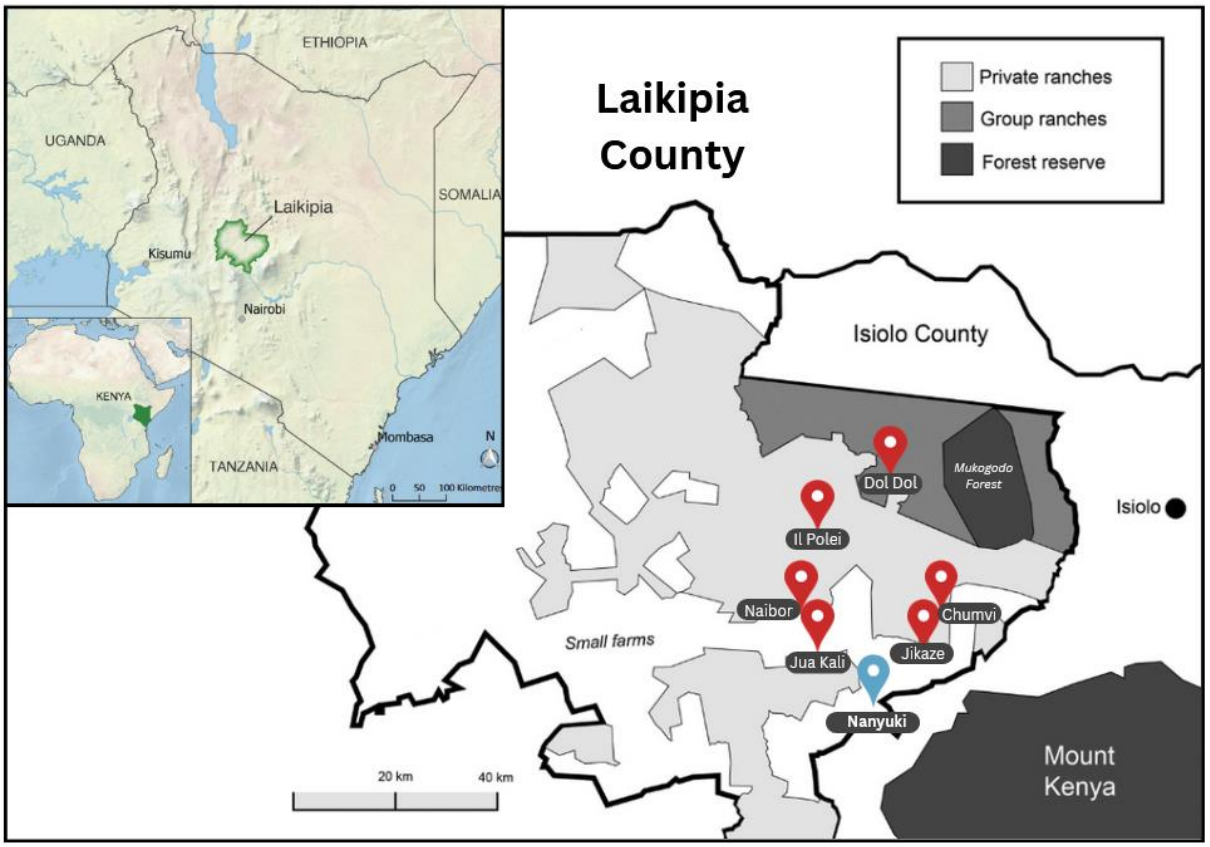
Semi-structured qualitative interviews are a widely used research method that is conducted to capture how individuals experience and perceive their everyday realities, providing a basis for interpreting the significance of the phenomena they recount (Brinkmann, 2013). With their open-ended question character, interviewees can share their views and experiences in their own words, offering deeper insight into their realities while allowing flexibility to discuss upcoming subjects in-depth (Knott et al., 2022). In line with common research practice, interviews are the sole data collection method of this work (Karatsareas, 2022).

Building on this decision, this research adopts a social constructivist perspective which assumes that reality is not objectively given, but shaped through human interpretation and social interaction (Mann & MacLeod, 2015). The knowledge produced in this study is thus seen as co-constructed between researcher and participant, reflecting the subjective meanings individuals assign to their experiences, rather than aiming to uncover an objective truth (Mann & MacLeod, 2015).

3.2 Research area

3.2.1 Laikipia County

Laikipia is a semi-arid county in the central north of Kenya's Rift Valley region (Ameso et al., 2018). It encloses the Mukogodo Forest in the East and borders Mount Kenya in the South (Map 1). The climate is characterised by two rainy and two dry seasons, with the long rains typically occurring from March to May and the short rains around October and November, although with increased variability due to climate change (County Government of Laikipia, 2022; Yurco, 2017). Located on the Laikipia plateau of around 2000m altitude, it is characterised by a dry climate with approximately 550mm of annual rainfall and common cyclical droughts every 3 years (Ameso et al., 2018; Karanja, 2019; Ndiritu, 2021).



Map 1. Laikipia County. Red pins mark research sites. Blue pin in Nanyuki marks the research base. Only the group ranch surrounding Dol Dol is under community management with guaranteed access rights for community members. No animals are allowed to graze in the neighbouring Mukogodo Forest. Maps used from Fox (2018) and Witt et al. (2020).

The majority of the inhabitants are pastoralists practicing traditional livestock keeping which is highly dependent on intact ecosystems to provide pasture and water for sustaining animals (Jane et al., 2013). As over 50% of the land is owned by private ranch owners of mostly European descent (Ndiritu, 2021), only 7% of Laikipia's land is dedicated to community rangelands managed by Maasai communities, which results in a conflictive setting over land tenure exacerbated by climate change-induced droughts (Letai & Lind, 2013; Wanjiku et al., 2023).

3.2.2 Interview sites

A total of 18 Interviews were conducted in six settlements in Laikipia North, one of the three sub-counties. The interview locations were identified with the help of my facilitator who has extensive knowledge of Laikipia North and good connections to spokespersons in the identified locations. All interviews took place between the first and second week of March marking the final days of the dry season in Laikipia.

Eight interviews were conducted in the Maasai community of Dol Dol and its immediate surroundings. Dol Dol is a lively market town (Picture 1) in a hilly area and a hub for livestock trade. It is almost exclusively inhabited by pastoralists and characterised by a hot and dry climate with little vegetation or

trees. The town is connected to the city of Nanyuki by a single unpaved dirt road passing through private ranches practicing wildlife conservancy (Picture 3).

Picture 1: Local market for general goods in Dol Dol's central area. Three interviews were conducted here with pastoralist vendors. Own picture.

Picture 2. Rural part of Dol Dol where two interviews were conducted with a young pastoralist and an elder. Own picture.

Picture 3. Dirt Road to Dol Dol passing through fenced-off private wildlife conservancies (right side). Credit: Peter Wagutu (facilitator).

Il Polei, Naibor, and Jua Kali are small settlements located along the road to Dol Dol. While Il Polei is dominated by pastoralist activity, Naibor and Jua Kali support mixed livelihoods with pastoralism but also other sources like small-scale subsistence farming and trading. Their proximity to Nanyuki results in better infrastructure. The research locations of Jikaze and Chumvi, where four interviews were conducted, are characterised by a mix of pastoralists and small-scale farmers. While Jikaze with its paved road to Nanyuki borders the hills of Dol Dol to the north with its low-lying pasture lands (Picture 4), Chumvi is located in a hilly but fertile setting only accessible by dirt road (Picture 5).

Picture 4. Small pastoralist homestead (left side) on the outskirts of Jikaze on a rainy day. The hills of Dol Dol rise in the background. Own picture.

Picture 5. View of Chumvi from the rain-soaked dirt road on a hill close by. Own picture.

3.2.3 Interview sample

The interview sample includes seven women and eleven men with an average age of 39 years, all of whom identify as Maasai pastoralists. Respondents were initially identified through my facilitator who has excellent connections to the residents in the research locations. In general, purposive sampling (Knott et al., 2022) was used as respondents had to be pastoralists but also, ideally, be familiar with climate change-induced vulnerabilities and adaptation measures; for example, persons who distinguished themselves through engagement in sustainability projects or community meetings. While most interviews were arranged in advance through his contacts, we occasionally used snowball sampling (Knott et al., 2022) to identify further viable respondents. Interview settings included public spaces as well as the homes of interviewees upon warm invitation.

Table 1. Interview details of the 18 conducted semi-structured interviews for this study. Own table.

Research sites	Interview Setting	Number of interviews (18)	Gender ratio (f | m)
Dol Dol Area	Market place, public courtyard	4	2 | 2
Dol Dol Area	Homestead after invitation	4	1 | 3
Jikaze and Chumvi	Homesteads after invitation and clothes shop	4	2 | 2
Il Polei, Naibor, Jua Kali	Market place	5	1 | 4
Nanyuki	Café	1	1 | 0

3.3 Interview method

The questionnaire (see Appendix 1) is split into four chapters, *demographics*, *climate vulnerability and adaptation*, *migration*, and *local democracy*, whereas the order could vary according to interview flow. To operationalise the theoretical concepts, questions about vulnerability and adaptation comprised, for example, environmental changes and their effects on daily lives and knowledge of adaptation strategies, respectively. Questions on permanent migration[2] were of hypothetical nature to assess the self-perceived aspirations and capabilities of to do so. Perception on democratic performance was operationalised through felt representation, participation, and equity in the process of shaping climate policies.

Interviews lasted between 45 minutes and one hour and were not recorded. This decision was made as interviewees mentioned trust issues when being asked for recording permit. Based on this, my translator affirmed that recording is not deemed viable in this context as respondents might not talk freely. In contrast, note taking was gladly accepted. Thus, all responses were noted by hand.

Next to Maa, all participants spoke Swahili as the common lingua franca in Kenya and had good command of English on average. Six interviews were conducted in English at the request of the respondents, while the remaining interviews were held in Swahili or a mix of Swahili and English (see Appendix 2). Brief explanatory exchanges were facilitated by the translator in Swahili, which supported both mutual understanding and trust-building. The translator was thoroughly briefed on the research objectives to ensure accurate and consistent communication.

In consultation with my translator, responses were translated by meaning and not by word – a practice commonly applied (Temple & Young, 2004). However, due to this procedure, some notes speak of the respondent in third person (*"she thinks that …"*). To ensure unambiguity of direct quotes in the findings, these formulations were grammatically changed into first person (*"I think that …"*).

Generally, trust building was ensured through small-talk conversations between me, the translator, and the facilitator before the interview began. Strict compliance to research ethics as outlined by the Swedish Ethical Review Authority (Görmann, 2024) was ensured at all times and oral consent (Knott et al., 2022) was obtained before the interview.

[2] A terminological challenge arises when conducting research in a pastoralist context as Maasai pastoralists view themselves as *migrating* when Maasai men lead their cattle through the county in search for pasture seasonally as part of traditional pastoralist livestock migration. Thus, pastoralism does not fit the common definition of migration, as their family and homestead remain in their community. Therefore, it was made sure that during the interviews, all participants always knew what type of migration, livestock or permanent, is talked about.

3.4 Data analysis

The interview data was analysed using a thematic coding approach following Clarke and Brown (2016). A primarily deductive coding framework was developed based on the research framework (see 3.1) to guide the coding process while allowing space for inductive insights as described in Betts-Davies et al. (2024). This combination of deductive and inductive coding enabled a structured yet flexible interpretation of the data. Following the recommendation by Neuendorf (2018), NVivo was used for computer-assisted qualitative data analysis to ease the organisation, comparison, and refinement of codes across interviews.

3.5 Positionality

As this research adopts a social constructivist perspective, I am aware that the knowledge produced in this work is the result of exchange between me, my translator, and the interviewees. My role in this research was not only to collect narratives through semi-structured interviews, but also to interpret them through constant reflection on my position, my cultural background, and my potential influence on the research context. While my understanding about Maasai pastoralism in Laikipia grew by the day, I can only view the information shared by the participants through my own self.

Conducting fieldwork in Maasai pastoralist communities required an awareness of social, cultural, and historical dynamics, including legacies of colonialism, power imbalances, and language barriers. For this reason, I collaborated closely with my facilitator, my translator, and other persons I got to know to foster my understanding of my work, the information shared in the interviews, and the general notion of life in Laikipia. Additionally, the strong local networks of my facilitator enabled me to conduct seven expert interviews, including government officials, researchers, farmers, and local spokespersons, which further complemented interview data.

4 Findings

4.1 Perceived climate vulnerabilities and adaptation strategies

The interviews show that the main perceived vulnerability is drought and its effects on livestock, induced by changing seasonal rain patterns due to climate change. Drought-related vulnerabilities are water scarcity for both human and animal consumption but also flash floods and the uncontrolled growth of the invasive opuntia cactus. Key adaptation measures address these vulnerabilities by undertaking efforts to ensure water access through a mix of sources, including the borehole, homestead rainwater tanks, or water pipes. The introduction of new breeds to mix with the indigenous sheep and goats aim for more drought-resistant livestock production which is frequently applied and supported by NGOs and government. These actors also support income diversification strategies to reduce the dependency on livestock.

4.1.1 Perceived vulnerabilities

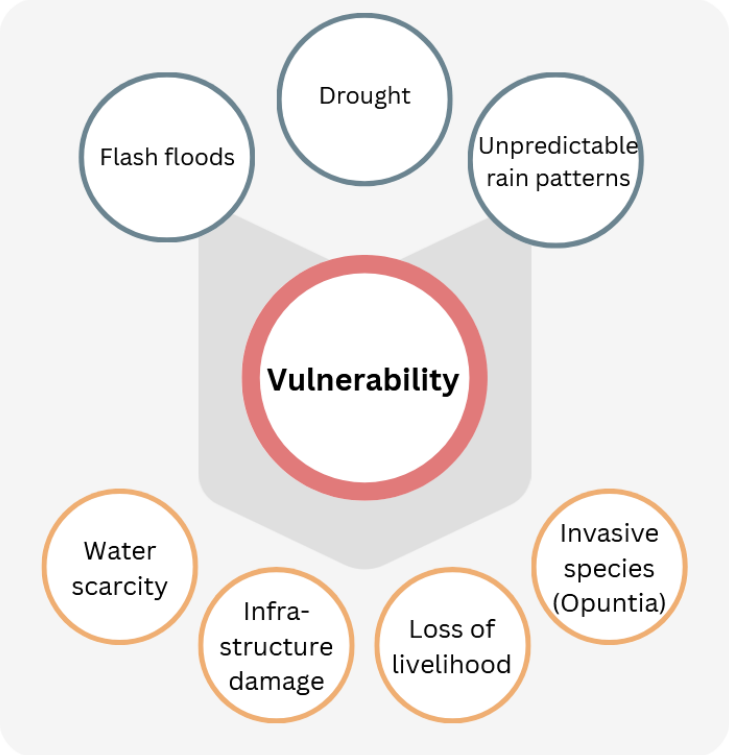


Figure 2. Climate vulnerabilities. How climate-induced environmental changes (blue) result in vulnerability (red) of system components (orange). Own figure based on the results.

The participants identified a range of climate impacts to which they feel vulnerable. The most frequently mentioned climate impact was *drought,* mentioned by all 18 participants. When asked about the environmental changes in the past ten years, 11 participants mentioned prolonged or worsened drought, paired with seven participants complaining about *changed rain patterns* and an additional six mentioned *less rain*, specifically. Drought is a particular problem for Maasai pastoralists as that "always means low pasture and low water availability" for the animals (P12) and if "there's no pasture, there's no milk" (P14), which has implications on food security and financial performance. Drought hits pastoralist communities particularly hard if their income predominantly relies on livestock feeding on rain-fed pasture. Furthermore, drought inevitably results in *water scarcity* (P16), as local tanks, boreholes, and even pipelines often fail to provide a reliable supply of water for human consumption, let alone for livestock.

All other mentioned vulnerabilities are related to drought, which is why P13 identifies drought as "the overarching problem". *Flash floods* were mentioned by 30% of all participants and represent the second most mentioned vulnerability. Flash floods typically occur at the onset of the rainy season, when the dry and barren soil has little to no capacity to absorb the intense rainfall, leading to rapid surface runoff in the hilly areas around Dol Dol. The resulting water masses wash away roads (Picture 7), erode

riverbanks, and hinder the growth of new vegetation, further exacerbating soil erosion in a positive feedback loop. As rural communities are only accessible by a single dirt road, flood damage has far-reaching implications which can slow down economic activity for weeks after the flood (P2). This exemplifies the importance of redundancy in a system: bottle-neck system pathways increase vulnerability towards disturbances.

Another drought-related vulnerability is the excessive growth of the invasive cactus *opuntia*, mentioned by six participants (picture 6). In Kenya, seven varieties of opuntia are present with *opuntia stricta* and *opuntia engelmannii* being the most present in Laikipia county (Githae, 2018). Brought into the country for decorative and protective purposes by colonial settlers, the invasive cactus nowadays represents a key challenge for local rangeland management (Witt et al., 2020). Opuntia harms pastoralists in two ways: First, it stores water during the rainy season and grows during the dry season when grass is drying up. This results in an incremental displacement of grass and an increase of opuntia, representing a positive feedback loop. This again leads to less pasture for the Maasai's livestock. Second: As the animals have less grass to feed on, in their desperation they start to eat the opuntia's fruit whose flesh is edible, but their thorns harm their mouths, noses and eyes. This results in severe injuries and infections that weaken the animals. The uncontrolled growth of opuntia is viewed with great concern among the participants as Maasai rely on intact grazing grounds to keep their livestock strong and healthy.

Picture 7. Invasive opuntia growing around Dol Dol displacing pasture. Own picture.

Picture 6. The road to Dol Dol crossing a dried-up riverbed which is prone to flash floods. Own picture.

The effects of droughts have cascading impacts on many different aspects of life which leads to a feeling of general suffering, like P18 shares: “Life is unbearable”. Next to a forced reduction of livestock because of resource scarcity (5/18), there is also a reduction of livestock trade (2/18) and lower prices for thinner livestock during drought (6/18), which leads to lower general income (4/18). Additionally, in search for viable pastures following drought, “people are less at home but migrate a lot more“ (P5), „because of climate change you need to move further with the livestock and check up on them more. That means less time for something else“ (P15). Increased livestock migration was mentioned by seven participants. Furthermore, „sometimes the livestock dies during migration“ (P4) due to the strains of travelling, diseases, and different climatic conditions in the destination area, often Mukogodo forest or Mt. Kenya, where it is much colder due to the higher altitude. The death of livestock has not only devastating economic effects but also psychological impacts, as one participant reported suicidal thoughts after losing all his 60 cattle to pneumonia following a long migration to Mt. Kenya. Because of drought „pastoralists are suffering nowadays“ (P3).

4.1.2 Perceived adaptation strategies

As it was clear for most of the participants that climate change is a complex global phenomenon that will effectively change rain and drought patterns for years to come and exacerbate their vulnerabilities, 17 out of 18 participants were familiar with climate adaptation strategies that buffer climate risk. Overall, 17 adaptation measures could be identified through the interviews. They can be grouped in three themes, mainly *water access*, *livelihood diversification*, and *livestock management*.

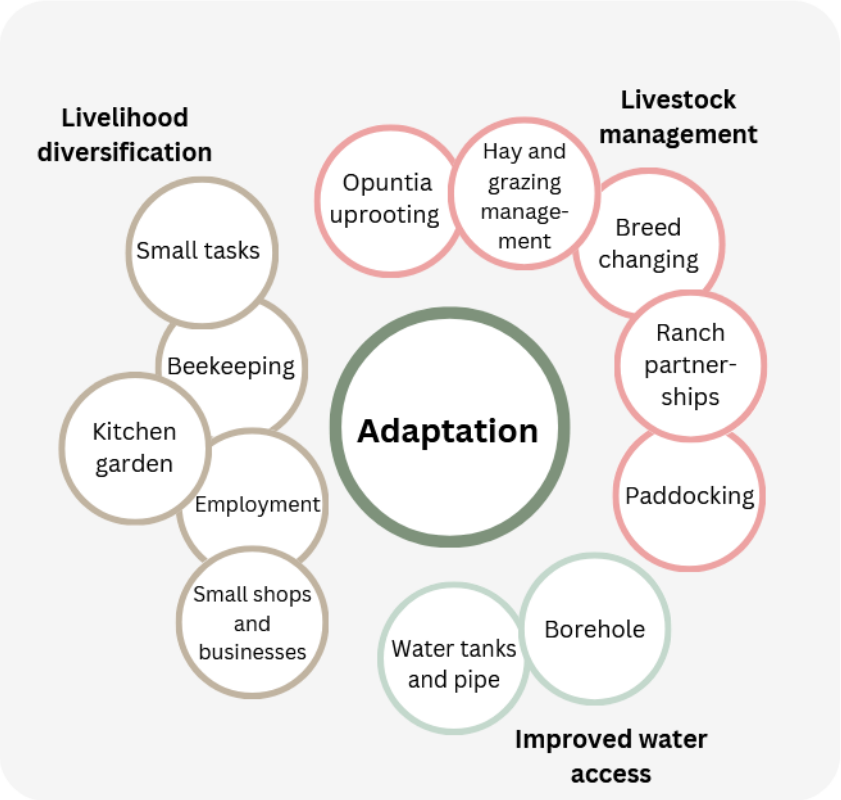


Figure 3. Adaptation strategies. This figure shows the most important identified adaptation strategies, grouped by theme. Own figure based on the results.

Water access

The most mentioned adaptation measure was the borehole (13 out of 18). Often a simple well, it is perceived as a medium effective adaptation tool. One participant argued that they do not view the borehole as adaptation but as the "last resort" (P15). However, it will be listed as an adaptation strategy as it complements other water sources in the long-term, and it is particularly important during drought. While getting water from the borehole is existentially important for survival, it was often highlighted that the amount of water only suffices for minimal individual consumption and not for the animals, as "it runs dry during drought" (P17). This applies when the amount of water in the borehole is just too little during severe drought, but also in open boreholes where human-wildlife-conflict over the access of that water is common. "You compete with the elephant for water" (P18), which is particularly prone to happen around sand dams (Picture 3), artificially held back riverbeds that store clean river water in about 1m depth and thereby preventing it from evaporating.

Picture 8. People digging for water on a sand dam close to Dol Dol. Own picture.

Picture 9. Collectively owned bee hives on a homestead in Dol Dol. Own picture.

Besides boreholes, participants mentioned water access through rainwater tanks (5 out of 18) and in infrastructurally better connected areas water pipes. However, both sources rely on rain and are not reliable during drought. For example, all participants who are connected to pipes (5 out of 18) stated that water is pumped through the pipes irregularly, partly only once a week. While the small amount of water is barely enough for human consumption, participants complained that the pipe "does not sustain animals" which is "not ideal for pastoralists" (P8). For this reason, two participants explicitly wish for a drought-resistant water dam that sustains livestock, wildlife and humans alike (P8, P14).

Diversification strategies

As described by resilience theory, diversification and redundancy are key factors to increase the resilience of a system. Adapting to environmental disturbances by diversifying the household income through additional source except for pastoralism is a commonly deployed strategy. 17 out of 18 interviewees generate income from livestock trade while one person has lost all its livestock in a severe drought.

Six participants stated to receive income from employment, one by receiving a pension as a former teacher. For example, P13 works as a security guard, P17 and P18 work for occasionally for NGOs and two households have employment through the government. Employment is a relatively secure source of income as it is not directly tied to environmental disturbances and allows for long-term planning. Eight interviewees reported engaging in small-scale trade, selling goods such as sugar and handmade accessories like beadwork, or offering services like hairdressing at local markets or shops. Unlike

employment, these sorts of income are tied to the overall economic situation of the community: if drought causes financial distress, economic activity slows down and the vendor's business goes down accordingly.

Some diversification strategies are supported by NGOs, such as beadwork selling or beekeeping (Picture 9). Nine participants engage either collectively or privately in bee keeping and two participants know of the practice. NGOs like the SMACHS Foundation provide knowledge and bee hives to communities who can then sell honey occasionally. The bees feed on trees but also on the opuntia cactus, which makes them complementary to livestock which cannot feed on either. Selling honey is related to the economic situation as the affordability of honey during times of hardship goes down.

Kitchen gardens (practiced by 7 out of 18) and poultry keeping (practiced by 11 out of 18) are helpful as they provide additional sustenance. Small garden patches can be watered with grey water which is ideal during times of water scarcity (P14). NGOs and local women self-help groups support the maintenance of kitchen gardens with guidance and seeds (P9). In Maasai culture, all tasks around the homestead fall upon the women, which is why poultry keeping, mostly chicken, and gardening is seen as their responsibility. Kitchen gardening indicates a modern turn of traditional Maasai culture as farming is not practiced traditionally – "if you dig the ground, you are cursed" – as a Maasai proverb puts it (P18). Kitchen gardens symbolise that adaptation measures have not only ecological effects but are embedded in a social (gender roles), cultural, and an economical context.

NGOs facilitate household diversification through financial support, education, or workshops (P5, P17). NGOs like IMPACT Kenya offer payment for *small tasks*, like bead work, building dams, or rooting out opuntia, which supplements the income of community members sporadically.

Livestock management

When it comes to adaptation strategies for livestock keeping specifically, ranch partnerships are the most applied strategy, practiced by 14 of 18 participants. P11 explains that ranch partnerships are agreements between private ranch owners and pastoralists in which fenced-off ranches open their gates for a limited number of livestock and herders to provide pasture and water during drought in return for a fee. A serious problem is that "only a limited number of livestock is allowed and nowadays with all the droughts everyone wants in there" (P18), which sometimes forces pastoralists to split up their flocks (P15).

Secondly, in addition to a general shift in herd composition from cattle to smaller livestock such as sheep and goats, pastoralists are increasingly seeking to crossbreed their indigenous animals with breeds that offer greater resilience and economic value (9 out of 18). In the study area, the Dorper sheep is used for cross breeding with the Red Maasai sheep, which is a common procedure in ASAL

counties in Kenya (Wanjala et al., 2023; Zonabend König et al., 2016). The Dorper sheep is characterised by a black head, fast growth, its adaptability to a harsh, dry climate, and its high-quality meat (Ojango et al., 2023). As described by the participants (e.g. P11) and the literature, a ram is used to mate with a flock of Red Maasai Sheep to spread the Dorper genes (Wanjala et al., 2023). An equivalent process is seen with the fast-growing Galla goat as reported by four out of 18 respondents, however with the purpose of dairy instead of meat production (Mutunga et al., 2023). NGOs and the county government support breed crossovers by providing suitable rams and organising the breeding process (P9, P14).

Picture 10. Dorper sheep crossing the road on the way to Dol Dol. Own picture.

Picture 11. A flock of young mixed galla goat breed close to Il Polei. Own picture.

Other mentioned adaptation strategies were paddocking, the practice of keeping livestock rotationally in designated grazing areas to manage grass consumption. Highlighted by six respondents, this method allows vegetation to regenerate, extending feeding capacity of the land into the dry season (P4). A downside is that this technique requires sufficient land which is not always the case on community land where most community members graze their livestock (P18). Destocking, meaning to reduce herd size while simultaneously diversifying income sources, was identified as a key strategy to cope with resource scarcity during drought (P9, P16). However, the phrasing reflects a sense of compulsion, as illustrated by P18's remark: "whether you like it or not, you have to reduce livestock so you can sustain them."

Another measure to increase the amount of potential rangeland is to uproot the invasive species of opuntia. This process needs heavy machinery and is organised by NGOs who pay participants as part of the aforementioned "small tasks" scheme. P5 declared that "NGOs help by organising the uprooting of opuntia and providing grass seeds during rainy season". Once grinded and drained, the shredded opuntia debris can be used for fodder and the water from the succulent can be used for irrigation (P14). Notably, the cochineal insect was introduced in some areas as a biological control agent to curb the spread of *Opuntia* as it feeds on the succulent but only with medium success (P14).

Coping strategies

Some interviewees mentioned coping strategies which included farther and longer livestock migration, stopping the livestock from breeding to reduce pasture use, selling livestock, or emergency food or hay deliveries from NGOs or the government.

4.2 Perceptions on migration

The analysis reveals that perceived climate vulnerability tends to increase individuals' aspirations to permanently migrate while simultaneously diminishing their capabilities to do so, primarily due to resource constraints and livelihood insecurity. In contrast, adaptation strategies such as improved water access, livelihood diversification, and livestock management improvements often reduce migration aspirations by making local livelihoods more viable, while also strengthening capabilities by enhancing resilience and reducing the risk of becoming 'trapped' or displaced. Additionally, various intervening factors such as place attachment, land ownership, social cohesion, cultural ties, and perceived responsibility toward the land significantly influence both aspirations and capabilities, either positively or negatively.

4.2.1 Aspirations to permanently migrate away

Effect of vulnerability on aspiration

Overall, drought-related impacts on respondent's daily lives increase the aspiration to migrate. An older woman working as a vendor on the local market puts this unequivocally as: "vulnerability motivates me to go" (P2). Nine out of 18 respondents could image to permanently migrate away from their community. Six of them name drought as the reason to move, two water scarcity, and one person opuntia growth (see Figure 4), indicating that vulnerability perception plays a significant role in migration decisions.

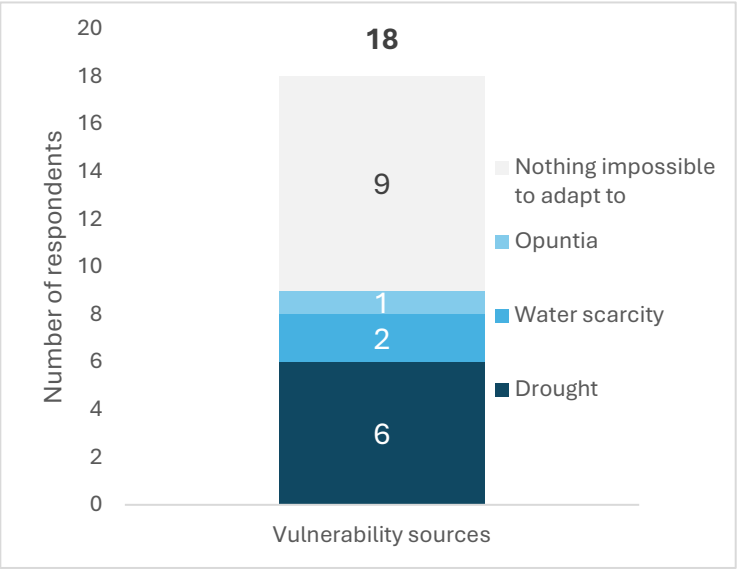


Figure 4. Migration aspiration due to climate vulnerability. Number of respondents mentioning reasons for leaving or staying, respectively. Own figure, based on results.

A factor increasing migration aspirations might be the expectation of future climatic changes: Three respondents expect "changing rain patterns in the future" (P4), six think that "drought will get worse in the future" (P3), and four predict that "there will be less livestock" (P17).

However, the reason more respondents do not express this direct vulnerability-migration-causality is found in the perceived effectiveness of climate adaptation strategies but also in intervening mediator variables for whose exclusion when answering could not be guaranteed for. Subsequently, the next section sheds light on the effect of adaptation strategies in constituting migration aspirations.

Effect of adaptation on aspiration

"There is no escape from climate change, you must adapt" (P15). With this attitude being frequently found among the interviewees, it becomes apparent how important adaptation is perceived. And indeed, adaptation measures reduce the aspiration to migrate. All 18 respondents strongly agree that adaptation strategies make staying more viable and, hence, reduce migration aspirations. For example, NGOs take a prominent role in implementing adaptation strategies successfully: „The NGO is the reason that we are still here. If they weren't, we would have migrated away a long time ago" (P2). Furthermore, P4 states that the adaptation measures they use "motivate me to stay and stick to livestock". Especially the ranch partnerships as support for pastoralist mobility were mentioned to reduce the aspiration to permanently migrate (P8, P12). P9 showcases that income diversification and the ability to switch from livestock keeping to other livelihoods leads to him seeing "no need to leave". When asked what the interviewees perceive as impossible to adapt to, nine out of 18 said that nothing is impossible to adapt to (see Figure 4). While this could be seen as a sign of exceptionally high perceived adaptive capacity,

it is more likely that, for various reasons, migration is not a viable option, making adaptation the only available path to maintaining a dignified life.

The following quote by P18 underscores the general effect of adaptation on migration aspirations: "My motivation [to permanently migrate] is reduced through adaptation". P6 estimates that "one out of a hundred people move away permanently", underlined by P8 stating that "most people do not migrate away permanently". However, since migration aspirations are complex and consist of a multitude of factors, mediating variables have decisive intervening effects. Thus, it cannot be said that adaptation is the sole reason why some of the respondents do not want to leave. Several key intervening variables emerged from the data, highlighting a broader social, cultural, and economic context shaping their aspirations. These include Land ownership and land use rights on community lands (3/18), sense of community (15/18), place attachment (8/18) and sense of belonging to Maasai culture (9/18), and lastly, a felt responsibility for land and community (3/18).

4.2.2 Capabilities to permanently migrate away

The interviews indicate that migration capabilities are reduced by climate vulnerabilities but strengthened through adaptation measures and other, more indirect societal developments.

Vulnerabilities generally reduce positive freedoms to migrate by reducing household income, mainly through drought (see 4.1.1). This results in a lack of capital that could be used for the migration process itself but also to finance a new livelihood in the destination area. P1 and P17 share that financial constraints limit migration capabilities by saying that the cost of migrating would simply be too high. P8, who owns land in a different part of Laikipia, underlines that financial constraints prevent migration as it is "too expensive for the majority" to own land elsewhere. This traps Maasai who wish to continue livestock herding either on their land or, more often, on community land because migrating away would mean to give up on guaranteed land ownership rights, as P8 elaborates. In contrast, adaptation strategies make staying more viable (see 4.1.2) which has the potential to increase positive freedoms in the sense of migration capabilities, not at least through higher and more secure income.

However, there are factors that strengthen the capabilities of the respondents to migrate more indirectly. Strong social adaptive capacity (15/18) not only reduces aspiration but also increases capabilities through risk and knowledge sharing and financial help. Furthermore, five respondents expect improvements of infrastructure components like roads, (grid) electricity, and water access. Secondly, education is expected to spread (6 out of 18) which goes hand in hand with cultural change away from a traditional Maasai world view towards a "cosmopolitan" one (P16). While school education increases the general knowledge of the world which can spark aspiration to migrate, it also leads to higher qualifications in the job market, enabling a smoother transition from a pastoralist

lifestyle to a capitalistic-economic one, which, again, has the potential to establish a less climate-change-dependent livelihood. In general, eight out of 18 respondents feel a prioritisation of a sedentary over a pastoralist lifestyle. P13 shares that an NGO particularly "advise[s] against pastoralism" while P10 merely mentions that a "sedentary lifestyle is […] generally supported by current developments". Sedentarisation does not necessarily lead to permanent migration, but the decline of pastoralism would deprive herders of their livelihoods in rural areas, requiring alternative sources of income for households.

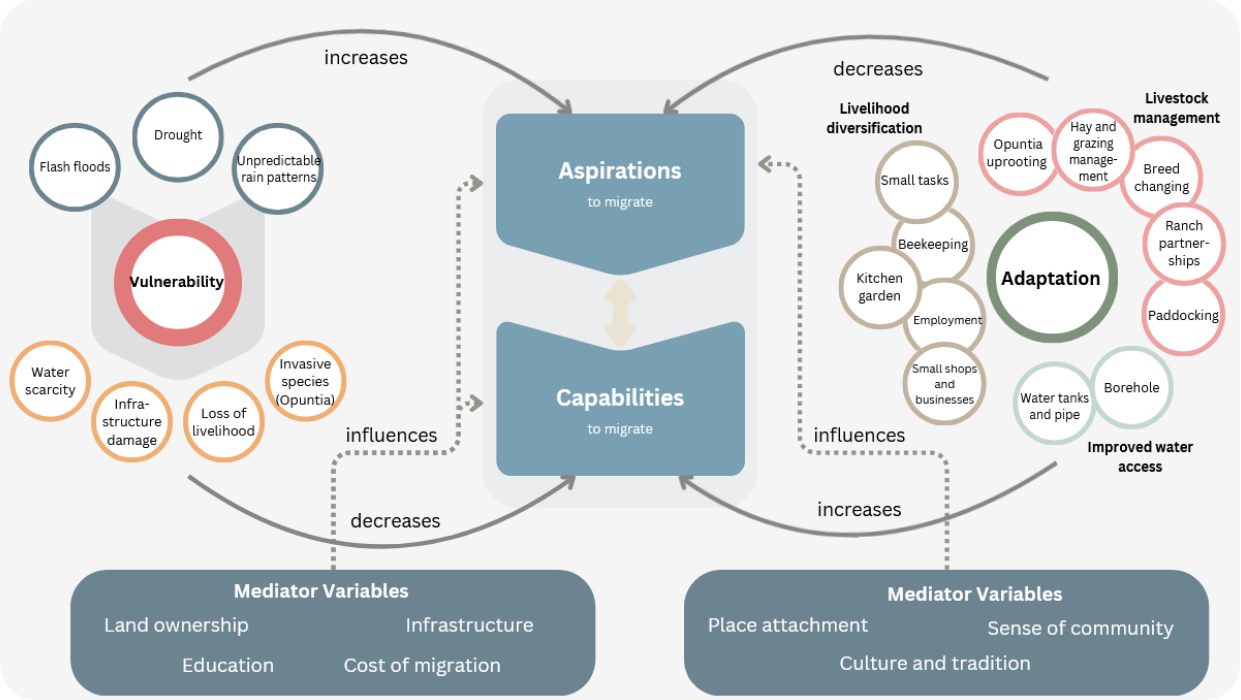


Figure 5. Effects of perceived vulnerabilities and adaptation strategies on aspirations and capabilities to migrate, answering RQ1 and RQ2. Own figure, based on de Haas's aspirations-capabilities-framework (2021).

4.3 Local democracy

The interviews show that many respondents know of their institutional representation in climate matters and mostly trust that they are being represented. Community and ward meetings are positively regarded for allowing citizens to influence project priorities through written proposals, so called white books, enabling them to justify and advocate for desired initiatives. While communication about the policy-making process is generally clear, the final allocation of resources by the county government is perceived as lacking transparency. In sum, participants perceive local democracy as partially functional in shaping climate policies, with strong participation in community meetings and some trust in representation, but they also identify persistent issues with transparency, equity, and the influence of social status in decision-making.

Representation

Participants reported mixed experiences with representation in decision-making processes. While many feel represented through the local chief (12 out of 18), or elected officials like the Member of County Assembly (MCA) (5 out of 18), others expressed dissatisfaction with these institutions. P15 for example complained that "the chief only receives complaints, but he does not represent you". Moreover, NGOs were highlighted as effective representatives by four participants, often perceived as more engaged and responsive than government actors. P13 even states that "only NGOs listen to the problems and actually work on it". Despite some improvements, particularly in gender inclusion during meetings, several participants still felt underrepresented (P2, female) and two felt not represented at all (P6 male, P18 female).

Participation

The most used form of participation are community meetings, which 17 out of 18 respondents attend. In these frequent meetings, all community members can publicly share their thoughts and discuss what measures the community ought to take. Voting in elections (12 out of 18) or budget processes is another way for participation mentioned by interviewees. Furthermore, several participants mentioned being actively involved in organising local initiatives (7 out of 18), lobbying for support, or participating hands on or advising on practices such as paddocking or afforestation (8 out of 18). While some feel empowered to influence strategies, such as one participant who serves as a ward secretary for climate change, others noted limited access to participatory channels. It is in these participative settings, however, where proposals, so called *white books*, for climate adaptation projects can be formulated and justified, making it a vital element of participation on the county and ward level, as P16 explains.

Equity

Opinions on the fairness of representation and participation varied widely. While some viewed the processes as equitable and inclusive, citing progress in gender and youth involvement, other voices claimed that political processes are "not equal at all" because "people with higher status are listened to more" (P10) or "people with more livestock get heard more" (P1). Socio-economic statuses are viewed as key source of inequality, where wealthier individuals were perceived as having more influence, especially when it comes to prioritisation of implementation of measures proposed in the white books (P16).

The perception about gender disparities varied strongly amongst the respondents, for example between P15, "there is a gap between genders" and P16, "there is equal participation between genders". Both participants are of male gender and live in the same community. P18, a female community leader, says in regard to gender disparities that "nowadays it's better" but "I still have to

fight for my rights". Additional equity concerns included exclusion of minority voices (P5) and unequal access to information (P15).

When asked about their ideas for improvement (answered by 12 out of 18), respondents emphasised the need for more equitable decision-making processes, urging leaders to avoid favouritism based on social status, especially regarding the prioritisation of projects from the white books on the county level. They also called for stronger government engagement with communities and greater inclusion of youth and women, alongside civic education to strengthen democratic participation.

5 Discussion

5.1 Summary of findings

Summarising the answer to RQ1, it can be said that drought and its cascading effects, such as water scarcity, flash floods, and the spread of invasive opuntia, are perceived as the most pressing climate-related vulnerabilities. Adaptation strategies focus on providing water access, diversifying income sources, and changing livestock management practices, often supported by NGOs and government initiatives. When it comes to the effects of climate vulnerability and adaptation on migration aspiration and capabilities (RQ2), the findings show that perceived vulnerability tends to increase aspirations to migrate while simultaneously decreasing the capabilities to do so due to livelihood instability. Adaptation measures, however, reduce migration aspirations by improving local living conditions and thereby enhance capabilities by strengthening resilience. Intervening factors such as place attachment, cultural ties, and social cohesion shape both aspirations and capabilities. Regarding the performance of local democracy in climate policy (RQ3), most participants feel represented and actively participate in adaptation planning, particularly through NGOs and community meetings. Yet concerns were raised about transparency and equity in decision-making, especially at the county level, where project implementation often diverges from community priorities.

5.2 The findings in the light of adjacent literature

While the findings mostly align with contemporary adjacent literature, there are minor differences regarding the definition of adaptation strategies and how resilience building affects migration aspirations.

5.2.1 Perceived vulnerabilities and climate adaptation

The study's findings that drought and its effect are considered the major vulnerability is in line with earlier studies like the quantitative survey analysis carried out in Laikipia north by Jane et al. (2013). While the invasive opuntia cactus was not mentioned as a vulnerability in Jane et al.'s study, the devastating effects of *opuntia stricta* growth on rangelands are documented by Strum et al. (2015) and strongly support the perception that opuntia is a major climate change-related vulnerability. The by an

interviewee under 4.1.1 described uprooting of opuntia and subsequent utilisation for fodder is found in the context of livestock keeping in North Africa by Pastorelli et al. (2022) and Nefzaoui and Salem (2002), as well as in Laikipia as reported in a news article by Kisambe (2023). While this practice seems not yet spread, it could potentially reduce vulnerability and improve fodder availability during drought.

Differences regarding the interpretation of whether the analysed measures are regarded adaptation or coping strategies are found between the findings of this study and two other major studies that research adaptation strategies (Jane et al., 2013; Ndiritu, 2021). For example, while increased livestock migration (over time and distance) falls under the definition of a coping strategy in this work, Ndiritu (2021) views it as an adaptation strategy. In contrast, all other strategies identified by Ndiritu (2021), namely fodder storage, water and livestock management as well as diversification on livelihood, are classified as adaptation strategies. This highlights the need for clearer distinctions between coping and long-term adaptation in resilience research. While this is a definition hurdle, the findings in both studies are identical, confirming alignment between this study's findings and existing literature.

5.2.2 Effects on aspirations and capabilities to migrate

This study demonstrates the successful application of de Haas's aspirations–capabilities framework, allowing for a more nuanced analysis of migration dynamics than the traditional push–pull factor model. In adjacent literature, Suckall et al. (2017) used de Haas's aspiration and capabilities framework to research the influence of climate change on migration in Malawi and found that climate-induced "stresses may erode human, financial and social capital, thus reducing migration capability" (p. 298). This finding is supported by the result of this study in which vulnerabilities reduce migration capabilities. However, Suckall et al.'s findings on migration aspiration reveal that climate distress among rural dwellers in farmers villages does not change their aspiration to leave their homes (Suckall et al., 2017). This is in stark contrast to the findings of this study, where half of the interviewees considers leaving their communities due to climate change.

A study carried out by Mayer et al. (2023) in Southern Ethiopia using qualitative interviews among farmers to assess the effect of resilience building on permanent migration with the help of de Haas's aspirations-capabilities-framework found that climate resilience increases migration capabilities but not necessarily lowers the aspirations to migrate. The authors found that resilience building merely reinforces already existing migration decisions: Those who want to stay are motivated to stay but those who wish to leave feel encouraged to do so or staying (Mayer et al., 2023). This finding showcases the influence of perceived capabilities on migration aspirations and aligns with de Haas's theory which states that the mere option of being able to migrate (sufficient capabilities) increases aspiration to do so (de Haas, 2021). While this effect might have played a role in shaping migration aspirations in this study, such an effect was neither asked for nor mentioned during the interviews. Even though such a

conclusion is not fully supported by the findings, it is likely that increased capabilities to migrate also increase the aspiration to so by making it a realistic and viable option, for example through having the capital due to successful climate adaptation to buy land elsewhere. Overcoming a lack of financial capital, which was mentioned as a major impediment by respondents for not being able to migrate, could therefore increase aspirations to migrate.

5.2.3 Local democracy in climate policy

Further empirical studies on the role of democratic elements shaping climate policies in a pastoralist context are scarce. Further research could focus on how the identified shortcomings of a perceived lack transparency and unequal participation can be addressed.

5.3 Emergent themes

To contextualise the results, the following section presents three key themes that emerged through the interviews which have direct effects on the resilience-migration-nexus of Maasai pastoralists: 1) Laikipia's colonial land ownerships rights under a decolonial perspective, 2) the concept of habitability as an alternative explanation for migration aspirations and capabilities and 3), traditional values amongst adaptation strategies.

5.3.1 Laikipia's colonial land ownership rights

Ranch partnerships or grazing agreements between pastoralists and ranch owners were frequently mentioned by the interviewees of this study as a key adaptation strategy as well as by adjacent literature (Ameso et al., 2018). Now, by examining these partnerships more closely, an alternative, decolonial perspective on the climate resilience of Maasai pastoralism is earned. What emerged from the interviews as a key determinant of climate vulnerabilities and adaptation as well as migration capabilities are Laikipia's land ownership rights that date back to the British colonisation of the country. The land allocation by British colonialists beginning in 1895 still determines land tenure in Laikipia and is responsible for the status quo of descendants of white colonialists and wealthy actors owning vast parts of Laikipia (Fox, 2018; Wanjiku et al., 2023). Maasai pastoralists, despite being the historical custodians of the land, now legally control only around 7% of the Laikipia Plateau (Letai & Lind, 2013). This limited land access undermines traditional pastoral mobility and impedes migration in response to environmental stress, exacerbating vulnerability to climate change (Mutisya-Kioko, 2024). Fencing by private ranches, along with conservation and commercial agricultural projects, has cut pastoralists off from critical resources such as water and pasture (Letai & Lind, 2013). This situation is further exacerbated by climate change and the associated loss of additional pastureland due to drought, the absence of rain, and the spread of opuntia, as described in the findings of this study. It is therefore not only climate change that reduces migration capabilities, but also the property rights originating from

the British colonial period. From this perspective, it would be accurate to say that climate change does not create the problems but merely intensifies them.

Thus, today's ranch partnerships can be viewed under a climate justice perspective as described by Schlosberg (2007), extended by a decolonial lens as argued for by Jones et al. (2024): Maasai pastoralists are reliant on being granted access to ancestral pasture lands by ranch owners and on the financial means to buy that access while bearing the brunt of climate impacts. This constellation is highly conflictive (Fox, 2018; Ndiritu, 2021), and it will remain a challenge to navigate traditional pastoralism, wildlife conservation, and land use rights under worsening climate change and reappraisal of colonialism. This case illustrates that climate adaptation happens under historical and social conditions and that the normative components of resilience research should be considered both when deciding on adaptation measures and when researching them.

5.3.2 Habitability as a holistic approach to analyse migration

While this study hypothesised the functionalist idea that adaptation reduces migration aspirations, the presence of multiple intervening factors reveals a more complex reality. Place attachment, community cohesion, cultural identity, and perceived responsibility were findings that enabled a deeper understanding of why individuals may choose to stay or leave in the context of climate change. Broader frameworks like *habitability* as described by Sterly et al. (2025) could help capture this complexity by situating climate among other migration drivers. The concept focuses on how environmental, socio-cultural, economic, and political factors jointly shape the conditions that make a place liveable, viewing migration as one of several possible responses to change or stressors (Horton et al., 2021; Sterly et al., 2025). This holistic, context-sensitive concept appears to be highly compatible with de Haas's aspirations-capabilities-framework and further research advance based on the findings of this study could benefit from a combined approach.

5.3.3 Traditional values under the pressure of climate adaptation

The findings revealed a strong connection to Maasai culture and a traditional pastoralist lifestyle. Thus, it is vital that adaptation strategies do not compromise compatibility with tradition, both for reasons of acceptance of adaptation measures and a maintained feeling of cultural belonging. However, it was also found that almost half of the interviewees feel a prioritisation of a sedentary lifestyle over the course of general modernisation. The findings suggest that the future evolution of Maasai pastoralism is more a subject to external climatic and cultural changes and pressures rather than the product of purposeful intrinsic motivation for reforms. Therefore, navigating this challenge with balanced and context-sensitive climate adaptation is needed. An example of a well-executed adaptation strategy that combines traditional compatibility with effectiveness is the frequently mentioned practice of paddocking. In the literature, paddocking in combination with reseeding is considered as a "modern"

(Mikula et al., 2022, p. 241) step towards a more versatile style of pastoralism in the face of climate and land rights challenges (Githu et al., 2022). This “effective use of rotational grazing systems” (Reed & Stringer, 2016) keeps elements of traditional livestock migration while reducing land degradation which improves pasture availability during drought (Githu et al., 2022). When deploying incisive climate adaptation measures, researchers and policy makers must be aware that subsequent changes are accompanied by effects on traditional lifestyles. A resilience thinking approach aware of its inescapable normativity requires these cultural components to be included in future research of place-based adaptation measures.

5.4 Limitations

While the research offers valuable insights, it is important to acknowledge limitations related to its design and realisation. Firstly, the small interview sample size as well as purposive sampling and snowball sampling of respondents prevent generalisability and replicability of findings. Especially the latter was necessary to ensure sound knowledge of the research topic among interviewees to have meaningful interviews but at the same time it might result in overestimating how much knowledge is actually spread about it amongst the “regular” population.

Additionally, limitations of translated interviews in an unfamiliar cultural context apply. Language barriers and limited cultural understanding cannot be entirely ruled out, despite efforts toward reflection, awareness, and immersion. My positionality, including pre-existing experiences and values as both a person and a researcher has shaped the research process. Furthermore, timing of the interviews during the final days of the dry season likely influenced participants’ responses and my presence in the field may have introduced the risk of confirmation bias.

It must be underlined that there is difficulty to unambiguously assign the manifestation of migration aspiration and capabilities to the influence of adaptation and vulnerability as there are unlimited individual mediator variables. While this was made clear over the course of this work already, it is worth emphasising that this results from the theory-guided deductive research design of this study. An inductive approach could shed light on the actual mix of reasons influencing migration decisions. The same applies for the focus on permanent migration as one form of climate-induced mobility: A wider lens could lead to further valuable findings on how various forms of mobility, for example seasonal labour (non-livestock) rural-to-urban migration, displacement, or voluntary immobility, are shaped by climate vulnerability and adaptation.

As the focus dedicated to perceived local democracy was only small, thereby not allowing for generalisation or structural insight, further research on local democracy among Maasai pastoralists in Laikipia should go beyond perceptions and explore (historical) institutional structures, legal

frameworks, and political dynamics to better understand its role in climate resilience and migration governance with special regard to Maasai values and pastoralist priorities.

Lastly, applying these findings to other pastoralist contexts in bordering counties or states may offer valuable insights, though differences in land tenure systems, governance structures, and cultural dynamics limit direct transferability.

5.5 Implications

The case of Laikipian Maasai illustrates that the option to permanently migrate, independently of aspirations to stay, is hindered by a reduction of migration capabilities through climate impacts. While aspirations are a product of personal and cultural aspirations, capabilities guarantee the freedom of movement and enable migration if deemed necessary. When thinking about the effects of resilience building and adaptation measures on migration, it can be said that the goal lies in the provision of sufficient capabilities to avoid 'trapped populations' that cannot decide about their mobility because of a lack of resource or freedom to do so. Based on the findings of this work, policy makers should consider three key points:

1) The provision of reliable water points for both humans and animals
2) Support for breed diversification and livestock management practices
3) Support for livelihood and income diversification

Additionally, addressing unjust land tenure while simultaneously promoting adequate adaptation measures would strengthen capabilities by making livelihoods more resilient. Lastly, transparency in the decision-making process of resilience building must be increased to ensure that communities can implement climate adaptation according to their priorities.

6 Conclusion

This thesis used semi-structured interviews to explore climate vulnerability and adaptation strategies among Maasai pastoralists in Laikipia County, Kenya. It further investigated how these affect aspirations and capabilities of permanent migration and assessed how respondents perceive the role of local democracy in shaping climate policies. Thereby, it linked climate resilience to climate-induced migration and contributed to the academic field of sustainability science not only by addressing the identified research gap, but also through its alignment to Target 7, *responsible and well-managed migration policies*, of Sustainable Development Goal (SDG) 10, which focusses on reducing inequalities, as well as Target 1, *strengthen resilience and adaptive capacity to climate related disasters*, of SDG 13, *Climate Action*.

The findings show that drought and its cascading effects such as water scarcity and flash floods are the most frequently reported climate vulnerabilities. To mitigate climate impacts, pastoralists have adopted a range of adaptation strategies that aim to improve water access, income diversification, and livestock management, often supported by NGOs and local authorities. Moreover, it was found that vulnerability increases migration aspirations but constrains migration capabilities, while effective adaptation can reduce the desire to migrate and strengthen capabilities to make self-determined mobility choices. Moving beyond climate-induced migration drivers, it could be identified that intervening factors such as place attachment or social adaptive capacity influence both migration aspirations and capabilities. The results of this work also provided an insight into the underlying contextual conditions that affect migration, such as the historically shaped and still existing land use rights or the ongoing sedentarisation. Further research could examine these factors with alternative theoretical perspectives such as decolonial climate justice or habitability, respectively. While the results of this study lack generalisability due to its small sample size, it can nevertheless be argued that policy interventions must focus on providing migration capabilities to ensure agency over mobility decisions by supporting pastoralist livelihoods through resilience building.

Making migration decisions in vulnerable areas is an inevitable event under progressing climate change. Protecting lives and livelihoods is the obligation of academia and policy makers alike. This work pursues to contribute to address that challenge.

7 References

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8 Appendices

8.1 Semi-structured interview questionnaire

Research questions:	Theme	Semi-structure interview questions
Check-in and control variables	Demographic and personal information	Welcome to the interview and again, thanks for taking time for this! I'll start by asking you to tell me a bit about yourself ○ First, where were you born? ○ For how many years have you been living the community? ○ How old are you? ○ What is your degree/years of education? ○ Do you own livestock? If yes, what type? ○ How many sources of income do you have? (bees, shops, kitchen gardens, livestock, …) Thanks! We're now moving on to your connection to your community and the place that you live in. First, … ○ What makes this place feel like home to you? ○ What do you think are changes this place will experience in the future?
a.) How do Maasai pastoralists in Laikipia perceive climate change-induced vulnerabilities and climate adaptation measures?	*Perception of climate change and vulnerabilities*	*Thank you! The next part of questions circles around climate change and vulnerabilities to the impacts of climate change in your community. Often times, climate change exacerbates/worsens existing conflicts or challenges, for example through longer droughts and unpredictable rainfalls. Now, I want to know how you personally experience climate change. So, …* ○ *In your experience, what are the biggest environmental changes you have noticed in your community over the past 10 years?* ○ *How have these changes affected your daily life, livelihood, or well-being?* ○ *Against which climate impact do you feel most vulnerable?*
	Perception of adaptation measure	*Thanks. Now I want to ask you what you know about climate adaptation measures or strategies and how you personally think of them, based on your experiences, for example. Now, …* ○ *What adaptation strategies do you know of? Who manages them?* ○ *Do you think they are effective? Why? Why not?* ○ *Do you feel they support you to diversify incomes and livelihoods?* ○ *If you think of how your community helps you to cope with climate change, how do your social capacities help you adapt?*
b.) How do perceptions of vulnerability and adaptation influence the personal aspiration and capability to migrate?	*Aspiration and Capability to migrate*	*Thank you so much! We're making fantastic progress! We're already in the third chapter. This one will be about climate change-induced migration. As you know, sometimes the impacts of climate change force people to move away either seasonally or permanently. I am interested in how the climate adaptation measures that we just talked about relate to migration and to how you think of migration.*

		So, first, let's start with your perception of climate-induced migration in general and then lead on with how adaptation influences your perception on migration. ○ *Do you think that [said] climate change impacts/vulnerability could ever influence your decision to permanently migrate away from your community and change your livelihood?* ○ *What would make you leave this place? What changes would be impossible to adapt to?* ○ *If so, would that be an individual move or would the community try to migrate as a whole? Why?* *Thank you! As you know, mobility is related to term of migration. Now I would like to hear from you how pastoral mobility is included in adaptation strategies* ○ *Do you feel that adaptation strategies protect your **livelihood** and your way of life as a pastoralist? Please explain why.* ○ *Do you feel some climate adaptation strategies include and support pastoral **mobility**? Like sustainable pasture and rangeland restoration?* ○ *Do you feel that current adaptation strategies prioritize a sedentary lifestyle over a pastoralist lifestyle? Do you feel an intention to make you shift livelihoods away from a transhumance existence?* *Okay thanks, let's jump to how adaptation affects your views on permanent migration. Now, I want to know how current climate adaptation influences your personal aspirations to migrate, but also your physical means, your capabilities, to do so.* ○ ***How does climate adaptation affect your aspiration to permanently migrate away from this place?** Do they affect your motivation to migrate? Positive or negative?* ○ ***How does climate adaptation affect your capabilities to permanently migrate away from this place?** Do they affect your physical possibility to migrate? Positively or negatively?* ○ *Do you feel that existing adaptation measures (e.g., government programs, community initiatives) make staying in Dol Dol more viable for you? Why or why not?*
c.) How do individuals perceive the performance of local democracy in shaping climate policies?	*Democratic elements and influence on policy formulation*	*Okay, last chapter! We were just talking about climate adaptation measures and their influence on your personal thoughts about migration. Now I want to speak about how these adaptation strategies are made and whether you think that you can influence the process. Especially, I want to speak about personal experience with democratic elements when it comes to climate adaptation.* ○ *Do you feel adequately represented when making decisions about climate adaptation in Doldol?*

		Through which institutional bodies do you feel represented? (community meetings, chief, MPs?) ○ *Do you feel that you can participate in shaping climate adaptation strategies?* ○ *Do you feel this is a fair process where every person's voice is treated equally? Or are there differences between gender, wealth, or age?* ○ *Lastly, what can be improved when it comes to these processes of local democracy?*

8.2 Detailed interview information for each Participant

Participants ID	Born	Living there since	Age	Education	Gender	Language	Interview place
P1	Dol Dol area	35 years	51	8 years	Female	Swahili	Dol Dol area
P2	Dol Dol	all her life	57	8 years	Female	Swahili	Dol Dol area
P3	Dol Dol	20 years	30	6 years	Male	Swahili	Dol Dol area
P4	Dol Dol Manyatta	all his life	29	High school, 12 years	Male	Mixed	Dol Dol area
P5	Dol Dol Manyatta	all her life	27	University degree teacher	female	Mixed	Dol Dol area
P6	Dol Dol Manyatta	all his life	27	Bachelor	Male	Mixed	Dol Dol area
P7	Dol Dol Manyatta	all his life	34	Bachelor	Male	English	Dol Dol area
P8	Dol Dol area	all his life	72	Teachers' college, 11 years of education	male	Swahili	Dol Dol area
P9	Naibor	all his life	35	Nursing diploma	male	English	Naibor
P10	Dol Dol	lives in Jikaze 7 years	29	No school	female	Swahili	Jikaze
P11	Laikipia East	17 years in Jikaze	35	6 years	female	Swahili	Jikaze
P12	Chumvi	all his life	43	No school	Male	Swahili	Chumvi
P13	Chumvi	all his life	45	10 years	Male	Swahili	Chumvi
P14	Laikipia North	since 21 years in the women's community in Il Polei	40	Diploma	female	English	Il Polei
P15	Laikipia North	Naibor, 37 years	43	12 years	male	English	Naibor

P16	Laikipia North	Naibor, 20 years	34	Diploma	male	English	Naibor
P17	Dol Dol	Jua kali, 13 years	36	12 years	Male	Mixed	Jua Kali
P18	Dol Dol	10 years	35	Diploma	Female	English	Nanyuki