



**UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA**

**PASTORALIST CONFLICT IN ETHIOPIA FROM 2015 TO 2022: CLIMATE
CHANGE AND FOOD INSECURITY AS EXACERBATING FACTORS**

by

Mandlenkosi Makhayeni Moyo

**A mini-dissertation submitted in partial fulfilment of the requirement for the
degree**

MASTER OF ARTS IN SECURITY STUDIES

In the Department of Political Sciences, Faculty of Humanities

at the

UNIVERSITY OF PRETORIA

Supervisor: Dr Robin Blake

July 2024

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION.....	1
1. Identification of the research theme	1
1.2 Contextual Analysis.....	4
1.2.1. The link between climate change and conflict	4
1.2.2 Exacerbating factors as a threat multiplier	6
1.2.3 Climate change and resource scarcity conflicts.....	8
1.2.4 The link and relationship between climate change, food insecurity and violent conflict.....	10
1.3 Research problem	12
1.4 Research question and sub-questions.....	12
1.5 Research aim and objectives	13
1.6 Research methodology.....	13
1.7 Ethical considerations.....	14
1.8 Limitations and delimitations	15
1.8.1 Limitations:	15
1.8.2 Delimitations:.....	15
1.9 Chapter outline.....	15
CHAPTER 2: LITERATURE REVIEW.....	17
2.1 Introduction	17
2.2 Pastoralists.....	17
2.3 Climate change	19
2.3.1 Droughts.....	20
2.4 Declining livestock productivity.....	22
2.5 Declining agricultural productivity	24
2.6 Food Insecurity.....	27
2.7 Resource-based conflicts	28
2.5 Conclusion	31
CHAPTER 3: CLIMATE CHANGE AND FOOD INSECURITY IN ETHIOPIA.....	32
3.1 Introduction	32
3.2 Historical overview of droughts and famine in Ethiopia	32

3.3 Climate change impact on Ethiopia	34
3.4 Impact of droughts in Ethiopia	38
3.5 Impact of climate change on livestock in Ethiopia	40
3.5.1 Declining pastures and fodder	40
3.5.2 Livestock productivity	42
3.6 Climate change and food insecurity	44
3.7 Conclusion	48
CHAPTER 4: THE IMPACT OF CLIMATE CHANGE AND FOOD INSECURITY ON PASTORALISTS	49
4.1 Introduction	49
4.2 Overview of pastoralists in Ethiopia.....	49
4.3 The impact of climate change on Ethiopian pastoralists.....	52
4.4 The impact of food insecurity on Somali region pastoralists.....	54
4.5. Historical context of the conflicts	57
4.7 The link between climate change, food insecurity and conflict among pastoralists in the Somali region.....	61
4.7.1 Climate change-related conflicts among pastoralists in the Somali region.....	62
4.7.2 Food insecurity-related conflicts among pastoralists in the Somali region	67
4.8 Conclusion	75
CHAPTER 5. CONCLUSION: SUMMARY AND EVALUATION	77
5.1 Summary.....	77
5.2 Key research findings.....	82

LIST OF FIGURES

Figure 1. Regional Map of Ethiopia	2
Figure 2. Topography of Ethiopia	35
Figure 3: Rangelands in Ethiopia	41
Figure 4. Pastoral areas of Ethiopia	50
Figure 5. Somali-Oromo conflict.....	60

ABSTRACT

This study explores how climate change and food insecurity account for an exacerbation in conflict involving pastoralists in Ethiopia from 2015 to 2022. Because of Ethiopia's geographical setting, terrain and over-reliance on rainfed agriculture the nation is extremely susceptible to climate change. The increase in temperatures and recurring droughts due to climate change have resulted in a drastic decline in crop yields and reduced pastures. The study focused on pastoralists in the Somali region and analysed conflicts with pastoralists from its neighbouring regional states that it shares borders with. The conflicts analysed were between the Somali-Afar and Somali-Oromia pastoralist communities between 2015 and 2022. Due to a lack of natural resources, these communities have been historically contesting territories along shared borders. The impact of conflicts on food and livelihood security of these pastoralist communities was also considered. The study finds that the Somali region of Ethiopia has suffered the most from climate change induced droughts and famine from 2015-2022 due to the arid harsh climate which has forced the communities to find alternative strategies of surviving these droughts. Not only did the study provide evidence of the link between climate change induced droughts and famines, food insecurity and livelihood insecurity, but it linked all these to conflicts among pastoralists communities. The research concludes that climate change and food insecurity significantly exacerbated conflict among pastoralist communities in Ethiopia between 2015 to 2022.

ACRONYMS AND ABBREVIATIONS

END	Ethiopian National Displacement
OCHA	United Nations Office for the Coordination of Humanitarian Affairs
COP	The Conference of the Parties
TPLF	The Tigray People's Liberation Front
EPLF	Eritrean People's Liberation Front
GHGs	Greenhouse gases

ACKNOWLEDGEMENTS

I would like to thank my supervisor Dr. Robin Blake, whose expertise was invaluable throughout my mini-dissertation journey. Thank you for the feedback, direction, encouragement, and support that has brought me to finishing my mini-dissertation.

I would like to thank both my mothers Percy Moyo and Prof. Sibusisiwe Magama and as well as my father Dr. EB Tanor for the constant love and support throughout my academic journey. I would also like to thank my older sister Dr. Gugulethu Moyo who has been a constant inspiration, support system and mentor in my life.

I would like to thank my friends and family who kept me motivated and checked up on me throughout this journey.

CHAPTER 1: INTRODUCTION

1. Identification of the research theme

Climate change can be regarded as the gradual and annual increase in a region's average surface temperature as a result of industrial or human activities (Santos and Bakhshoodeh 2021). Climate change is a reality that is impacting the lives of people across the world, ranging from uncommon and ferocious weather events to prolonged heat waves and drought. This global phenomenon is growing in intensity and measures such as those proposed by the Conference of the Parties (COP) to the UN Framework Convention on Climate Change are unlikely to meaningfully bring it to heel. Problems related to climate change affect both industrialised and poor countries. However, due to insufficient adaptive capacity, the impact is more serious and obvious in less developed countries (Ali and Rose 2021; Salman *et al.* 2018). Given this, it is important to understand how climate change exacerbates many areas of the human condition and among them, violent conflict.

The African continent is extremely vulnerable to the effects of climate change. Temperature increase on the African continent is predicted to be faster than in other regions of the world, potentially surpassing a 2°C increase by the middle of the 21st century and reaching 4°C by the end of the century (Adhikari *et al.* 2015:112). East Africa is one of the sub regions most susceptible to climate change on the continent. Fluctuations in temperature and precipitation patterns across the sub region lead to a higher occurrence and intensity of extreme droughts, floods, and rainfall (McDowell *et al.* 2016). These changes are likely to contribute to reduced crop yields (Radeny 2019:509-510) as they increasingly threaten environmental resources and sectors such as agriculture and water resources in the East African sub-region (Gebrechorkos *et al.* 2019:1).

Ethiopia, an East African nation as illustrated in Figure 1, is very susceptible to the adverse effects of climate change (Tadege 2007), due to its limited ability to respond and adjust to climatic challenges (Bhopal 2021:294) and often experiences climate-related disasters, usually droughts and floods (Gezie 2019). It is among the low-income countries where climate change severely affects socio-economic development

processes (Bekele *et al.* 2021). Ethiopia has experienced a considerable increase in temperatures, and decreased rainfall amounts right across the entire country due to climate change. This combination of higher temperatures and low rainfall has worsened the aridity of the country, and severely decreased crop yields and the quality of pastures (U.S. Geological Survey 2012). As a result, major food shortages and famines have been prevalent in Ethiopia leading to food insecurity.

Figure 1. Regional Map of Ethiopia



(<https://ontheworldmap.com/ethiopia/>)

Food insecurity has been a persistent problem in the country and is influenced by environmental, economic, political, and social considerations. For example, the famine of 1888–1892, known as the *kifu qen* (bad days), was among the most severe and well documented famine and is thought to have claimed a third of the nation’s population (Pankhurst 1966). The Wollo famine in the north- eastern region from 1972 to 1974 was another severe event. The Wollo famine, although mostly caused by severe drought, is historically significant since it coincided with the 1974 uprising and the eventual overthrowing of the monarchy by the military group under the command of Colonel Mengistu Hailemariam (Mesfin 1984; Talton 2014). Ethiopia was plagued with another famine in 1984-1985 that resulted in between 600,000 and one million

deaths, and a further 2.5 million citizens displaced (Africa Watch 1991). The 1984-1985 famine was exacerbated by, among other things, the civil conflict and drought.

After overthrowing the monarchy, Ethiopia continued to face food security challenges. Ethiopia was governed by the Provisional Military Administration Council, also known as the Derg. The Derg regime, which ruled Ethiopia under Mengistu Haile Mariam, faced allegations of using starvation as a form of warfare (Messer 2009). This strategy was prominent in the conflict in northern Tigray between the Tigray People's Liberation Front (TPLF) and other rebel factions. The Derg's goal was to purposefully obstruct the distribution of food and humanitarian aid to rebel-held areas (Lautze *et al.* 2009). As a response to the famine, the Derg dictatorship launched extensive resettlement efforts between 1984 and 1986 but many of these outcomes were unfavourable. Although about 300,000 people were resettled, it is estimated that between 33,000 and 50,000 people perished as a result of hunger, illness, and fatigue (Tefara 2023:2). Consequently, these resettlement efforts have played a role in the ethnic-related tensions that have plagued the nation.

Majority of the conflicts in Ethiopia are perceived as being ethnic conflicts, however most conflicts are territorial disputes between territorialised ethnic communities (Abbink 2006:389). The effects of climate change in Ethiopia can be indirectly linked to conflict and turmoil in the country. Recurrent droughts brought on by climate change have resulted in food and water shortages which have resulted in escalation of conflicts between agriculturalists and pastoralists over limited resources (Van Weezel 2019). According to Sharma *et al.* (2003), pastoralists are members of castes or ethnic groups with a strong historical connection to livestock-keeping. This observation by Van Weezel (2019), led to the research theme of this study.

The research theme of this study will focus on the impact of climate change and food insecurity on conflict in Ethiopia from 2015 to 2022. The study aims to examine the relationship between climate change, food insecurity, and conflict among pastoralist groups, and the impact on these groups.

1.2 Contextual Analysis

The contextual analysis will briefly deal with the debates concerning the link and relationship between climate change, food insecurity and violent conflict. It will also address the debates on climate change and resource scarcity conflicts. Lastly, this section will discuss the link and relationship between climate change, food insecurity and violent conflict, then transition to the research problem of the study.

1.2.1. The link between climate change and conflict

Over the past ten years there has been an increase in research questioning whether there is a significant link between climate change and conflict; with arguments both in support of there being a link between climate change and conflict (Burke *et al.* 2015) and in opposition of the existence of this link (Abrahams and Carr, 2017; Adger *et al.* 2014; Buhaug, 2015). Adger *et al.* (2014), state that there appears to be general agreement among researchers that there is no causal link between violent conflict, especially protracted inter- and intra-state conflicts, and climate change. Even though there is an increase in the number of studies linking climate change to violent conflict, the scientific evidence is still lacking "due to heterogeneous research designs, variables, data sets, and scales of analysis" (Adams *et al.* 2018:200). As stated by Buhaug (2015:269), a decade of comprehensive research on armed conflict and climate change has "revealed a number of interesting patterns but few results that are robust across studies." In accordance with Cappelli *et al.* (2023), empirical findings show that there is a link between temperature and precipitation fluctuations that result in declining living conditions of African communities in vulnerable regions and the outbreak of conflict. As a result of the acceleration of climate change in this unstable environment, these conditions tend to exacerbate tensions, leading to frequent armed conflicts and large-scale migrations.

There is no established direct link between climate change and conflict. A report by Sida (2018), on the link between climate change and conflict sums up the main finding that, although there is no clear link between climate change and violent conflict, in some cases it may have an impact on factors that contribute to or exacerbate conflict.

Reduced water supply and severe weather can, among other things, have a detrimental impact on food security and threaten the way of life for disadvantaged households and communities. The lack of institutions for resolving conflicts may subsequently cause local competitiveness to become uncontrollable as a result of dwindling natural resources. Buhaug (2016:33), asserts that while climate change does not directly lead to armed conflict, it may have an impact on the dynamics of interaction (including violent conflict) amongst societal groups. Such an effect will, however, coexist with, and occasionally interact with other common conflict causes, and will always be influenced by the particular situation.

The question of whether climatic changes systematically increase the probability of conflict or its scale is still up for debate, as stated by Koubi (2019). Some research (Fjelde and von Uexkull 2012; Hendrix and Salehyan 2012; Hsiang, Meng *et al.* 2011), suggests a link between rising temperatures or falling precipitation and violent conflicts. A contended notion and to some degree a perspective that has not yet been explored, is whether location-specific conditions magnify the impacts of changing weather conditions. It is agreed among scholars that, under particular climate conditions such as adequate rainfall, violence is less likely to occur in resilient communities (Buhaug 2015; Burke *et al.* 2015; Hsiang 2016). Nonetheless, empirical research is still unclear on the underlying mechanisms of local resilience since these mechanisms are not clearly understood, partly due to methodological flaws and other uncertainties (Ide 2017). Methodological flaws such as context-specific vulnerabilities are taken into account, the data that has been selected, and the time frame of the investigation (Ide 2017).

The increasing volume of research on the potential link between climate change and conflict over the past decades has so far not yielded any conclusive results. Some studies argued in favour of this link, while others opposed it. Most researchers agreed that there was no direct causal connection between climate change and violent conflict. While there may not be a direct causal link established in the literature, numerous studies have pointed to climate change as exacerbating existing conflicts among pastoralists and creating fertile ground for new ones. The relationship between climate change and conflict has remained a topic of debate that has gathered significant attention in recent years, with varying research findings and interpretations.

The impact of climate change on pastoral conflicts varies, depending on contextual factors such as national and regional economic conditions, political institutions, and the capacity of governments to address climate-related challenges. This study will apply climate change as an exacerbating factor. It will take into account how shifting climatic patterns, resulting in droughts or resource scarcity, may exacerbate already-existing conflicts or disputes over grazing areas and water resources in the context of pastoral communities in Ethiopia.

1.2.2 Exacerbating factors as a threat multiplier

Climate change can be regarded as a threat multiplier as it has been proven to further exacerbate ongoing conflict (Buhaug 2015; Peters *et al.* 2019), despite the lack of considerable studies demonstrating a causal connection between climate change and conflict. According to the threat multiplier idea, conflict will not necessarily be caused by climate change, but it might trigger it, accelerate it, or may exacerbate it. Climate change has the potential to intensify a variety of already-existing, frequently interrelated conflict factors, such as resource scarcity and uncontrolled migration (CNA Corp 2007). The impact on conflict will likely differ depending on contextual factors, including national and regional economic growth, political institutions, and the ability of national and local governments to deal with climate-related issues (Koubi 2019:348). In fact, a contextual factor that is of great importance when analysing the impacts of climate change as a threat multiplier is whether the area or region in discussion is heavily dependent on natural resources.

Countries heavily reliant or dependent on natural resources or are greatly impacted by resource scarcity are more prone to the detrimental effects of climate change and conflict. According to Ide *et al.* (2014), countries with high levels of poverty and a reliance on renewable resources, such as agriculture, are more vulnerable to the severe economic effects of climate change. According to studies by O'Loughlin *et al.* (2012) and Burke *et al.* (2009), an increase in temperature has also been linked to a higher chance of conflict. It can be a breeding ground for conflict when underlying resource scarcity is exacerbated by catastrophes caused by climate change (IPCC 2019). However, the threat multiplier perspective does have its drawbacks.

The threat multiplier debate, while useful in avoiding oversimplified causal arguments that concentrate on the impact of climate change in a particular conflict, has been shown to be limited, because it overlooks other ways by which climate change and conflict interact (Abrahams and Carr 2017; Dalby 2016; Oels 2015). These include the fact that the effects of climate change can be used as a catalyst for peace-building (Gemenne *et al.* 2014; Ide 2019), the significant role that conflict plays in increasing vulnerability to climate change (Adger *et al.* 2014; Gemenne *et al.* 2014), and the possibility that conflict could be sparked by adaptation efforts (Snorek *et al.* 2014). The argument that climate change can be a threat multiplier is convincing and its influence on policy communities is expanding (Abrahams and Carr 2017; Dalby 2016). This discourse is constricting even though it is undoubtedly logical and, to some extent, supported by evidence. As the focus of the discourse turns from policy development to on-the-ground interventions, it becomes more and more difficult to practically address the effects of climate change in a given conflict (Abrahams 2020: 34).

To conclude, this section sheds light on the ongoing discussion on whether conflict is exacerbated by climate change. The threat multiplier concept is emphasised, and this concept contends that, while climate change may not directly cause conflicts, it might exacerbate them by magnifying elements such as resource scarcity, migration, and conflict-related temperature increases. This section recognises that the effects of climate change on conflict depend on contextual elements including political institutions and economic growth. While noting various ways by which climate change and conflict are linked and the possibility that conflicts could make people more vulnerable to climate change, this section also draws attention to the limitations of the threat multiplier concept. Limitations such as overlooking the role that conflict plays in increasing vulnerability to climate change and the possibility that conflict could be sparked by adaptation efforts. The threat multiplier perspective essentially highlights how the impacts of climate change can act as exacerbating factors of conflict, depending on contextual factors such as areas with pre-existing grievances, a high dependence on natural resources, as well as scarcity of resources. This perspective can be applied to see how climate change interacts with contextual factors in Ethiopia. Ethiopia as a nation is susceptible to the impacts of climate change, and is one of the low-income countries where climate change severely affects socio-economic development due to its limited capacity to respond and adjust to climatic challenges.

1.2.3 Climate change and resource scarcity conflicts

There is no commonly accepted impact pathway connecting climate change and conflict, instead, indirect relationships are intricate and dynamic, with feedback mechanisms. Resource scarcity is the dominating narrative outlining the mechanism at work in the studies supporting the concept that climate is indirectly related to the start and duration of conflict (Klomp and Bulte 2013; Raleigh *et al.* 2015). Conflict is regarded as being fuelled by resource scarcity, which in turn is regarded as being caused by climate change (Evans 2011; Ide 2017). Two scarce resources that tend to be impacted by climate change are water and land.

Water and the availability of arable land are two resources that are frequently negatively impacted by climate change, and when access to these resources is restricted, conflict may result (Hendrix and Salehyan 2012; Koubi *et al.* 2012). Additionally, in countries that heavily rely on the agricultural sector, a decline in agricultural productivity due to climate change may result in lower wages and employment possibilities as well as higher food costs, which might significantly worsen conflict (Fjelde 2015). Although climate-induced resource scarcity does not directly result in conflict between pastoralists and farmers, it can play a significant role in facilitating escalation in situations where there is enough ethnic polarisation, political marginalisation, lack of access to conflict resolution mechanisms, and reliance on rainfed agriculture (Sweijs 2022:11). An illustration of this would be the seasonal movements of pastoralists.

These seasonal movements by pastoralists can spark resource competition. Resource competition in the host region can result in conflict, and shifting pastoral movement patterns are a clear illustration of this (Rigaud 2018). Due to the impact of climate change on the customary migration cycles of pastoral communities in East Africa, these groups have adopted innovative management approaches to livestock and farming practices. Occasionally, they find themselves in unfamiliar areas, including wandering into neighbouring countries as they seek grazing land and water sources for their livestock, consequently fuelling land conflicts between herders and farmers and undermining the effectiveness of traditional customary laws and methods for resolving disputes (Mobjörk *et al.* 2020:4; van Baalen and Mobjörk 2016).

Many individuals may have to leave their homes as a result of climate change thus resulting in the competition of scarce resources among different societal groups. According to Brzoska and Fröhlich (2016), the migration of numerous "environmental migrants" is expected to burden the economic and resource bases in the receiving regions, fostering competition for limited resources, and triggering ethnic tensions, because the inhabitants and newcomers originate from distinct ethno-cultural groups, and this upsets an unsteady ethno-political balance leading to conflict (Koubi 2019:348). Institutional capability, resource scarcity, socioeconomic development, ethnic fragmentation, and population increase are all variables that affect whether climate-induced rural-urban migration will contribute to igniting conflict (Ide *et al.* 2020). The limited resources that tend to be mainly contested are land and water resources.

Since the agricultural sector depends on natural resources such as land and water, it is therefore undeniable that this sector is the most susceptible to the changes in climate in developing countries (Raleigh *et al.* 2015). Agricultural practices, in combination with a rise in temperatures and variabilities in rainfall patterns, frequently result in heightened severity of droughts. These in turn, impact the livestock industry through increased prices and displacement of pastoralists who further compete more intensively among themselves for land usage (Maystadt and Ecker 2014). Accessibility to water is another link between conflicts and water scarcity induced by climate change, as control of water resources can be exploited for offensive and defensive purposes (Gizelis and Wooden 2010). Climate-induced shocks raise the likelihood of the outbreak of armed conflicts in specific socio-economic scenarios, such as instances where there is a significant level of ethnic fragmentation (Schleussner *et al.* 2016). Ethnic fragmentation can also be expressed as the situation where an ethnic group concentrates on cultural pursuits that make them especially susceptible to the dangers posed by climate-related factors (Von Uexküll *et al.* 2016).

The predominant narrative used to link climate change and pastoral conflicts is climate-induced resource scarcity. Climate change impacts natural resources like water, arable land, and grazing lands leading to competition and access control which can potentially cause conflicts among pastoralists as declining agricultural productivity due to climate change can lead to lower wages, unemployment, and higher food costs,

thereby exacerbating conflicts. Climate-induced resource scarcity does not directly cause pastoralist-farmer conflicts, but can exacerbate such conflicts in areas with ethnic polarisation, political marginalisation, limited conflict resolution mechanisms, and livelihood heavily reliant on crop and livestock farming. Resource competition, like shifting pastoral migration patterns for livestock (transhumance) due to climate change, can also trigger pastoralist conflicts.

1.2.4 The link and relationship between climate change, food insecurity and violent conflict.

Violent conflicts can also be caused by food insecurity. Food insecurity manifests as a lack of access to adequate food in terms of availability and affordability. A rise in food prices as a result of decreased agricultural productivity can cause protests against the government (Delgado *et al.* 2021:14). When food shortages cannot be eased, such as through governmental intervention, they frequently lead to grievances, disagreements, and ultimately to conflict (Byg and Herslund 2016). This concern is especially applicable to the food supply chain's manufacturing aspect (Delgado *et al.* 2021:13). However, conflict resulting from food insecurity can peacefully be managed if the necessary steps are taken.

The uncertainties due to physical and socio-cultural changes in the environment, such as droughts, can be managed peacefully by well-equipped and well-resourced institutions. However, the probability of such peaceful management of environmental shocks is greatly reduced when other factors, such as alleged inequalities, increase the danger of violent conflicts (World Bank and UN 2018). Furthermore, the perception of poor administration, patronage or corruption associated with food aid flowing into a country can also aggravate grievances or protests (Delgado *et al.* 2021:14).

In Africa, where the economic development of most nations is largely dependent on agriculture, any drastic and adverse changes in climate can lead to decreased economic growth (Couttenier and Soubeyran 2014). Increasing temperatures and unpredictable variabilities in rainfall patterns contribute to a decrease in food output (Delgado *et al.* 2021:13). This, in turn, could result in both livelihood insecurities and food insecurities, consequently contributing to the emergence of conflicts (Couttenier and Soubeyran 2014). Furthermore, research studies highlight the connections

between escalating food prices and the occurrence of violent conflicts (Breisinger *et al.* 2015). However, the challenge lies in understanding the mechanisms and extent to which high food prices act as drivers for violent conflicts (Martin-Shields and Stojetz 2019). Investigating the relationship between food price levels, price volatility, and unrest, Dago (2021:7) concludes that, while high food prices can lead to food-related disturbances, volatility in food prices is either unrelated or inversely related to social unrest. Nevertheless, the prevailing explanation for the link between food prices and conflict revolves around consumer dissatisfaction and the breakdown of state authority and legitimacy, particularly when the state fails to ensure food provision. Although food insecurity can initiate, exacerbate, or perpetuate conflicts, the literature emphasises that food insecurity is not the sole underlying cause of conflict.

According to the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) report (2022:3), following four failed rainy seasons starting in late 2020, Ethiopia is currently experiencing one of the worst droughts in the last forty years, thus placing the growing population at great risk. Pacillo *et al.* (2021: 7) also add that recurring droughts have exacerbated food insecurity, particularly in Ethiopia's driest regions of the Tigray, Afar, and Somali which are currently the most vulnerable regions to climate security issues.

Food insecurity occurs when people lack access to adequate and affordable food and can trigger violent conflicts. This section emphasised on indirect causality, recognising that climate change exacerbates existing vulnerabilities, but pastoralist conflicts arise within complex social, economic, and political contexts. Ethiopia's current severe drought highlights the real-world consequences of these contexts, particularly in the Tigray, Afar, and Somali regions, which are most vulnerable to climate-related food insecurity. This research is aligned with indirect causality perspective that regards climate change as being able to exacerbate conflict. It is known that climate change can aggravate pre-existing vulnerabilities, yet research often reveals that conflicts occur within contexts of intricate social, economic, and political dynamics.

1.3 Research problem

This research recognises Ethiopia as an example of how climate change and food insecurity exacerbate¹ violent conflict between social communities with specific reference to pastoralists communities. Climate-induced interruptions to the weather patterns, availability of resources, and agricultural productivity can result in a decline in access to food and in resource competition (Clarke 2022). These circumstances, in turn, foster an environment for conflicts to escalate. The gradual effects of climate change impact established food production and access patterns, especially in areas that are already vulnerable because of a lack of resources and adaptive capacity (Lioubimtseva and Henebry 2009). This disruption causes food insecurity, which in turn fuels conflicts over scarce resources by escalating social tensions and amplifying already-existing complaints. Although the link between food insecurity and violent conflict has received much attention in recent years, research that attempts to determine the exacerbating factors that link climate-induced food insecurity and the existing conflict is generally lacking (Pacillo *et al.* 2021:23). Prior to the last decade, most of the research that considered the relationship between these two factors mostly concentrated on evaluating the impact of conflict on food insecurity rather than investigating how food insecurity impacts conflict (Martin-Shields and Stojetz 2019).

1.4 Research question and sub-questions

The research question for this study is: How can climate change and food insecurity account for an exacerbation in violent conflict involving pastoralist communities in Ethiopia from 2015 to 2022?

¹ In the context of conflict, an exacerbating factor is a variable or condition that enhances or amplifies the conflict dynamics, increasing the complexity or volatility of the situation at hand (Jehn and Bendersky 2003). A conflict's escalation, continuation, or intensity can be influenced by exacerbating factors. These factors may combine with additional underlying causes or catalysts to intensify conflict-related tensions, violence, or other forms of aggression. Exacerbating factors can appear in many different forms and may vary based on the particular context of the conflict. Economic inequalities, disproportionate distribution of resources, or a lack of access to essential services can aggravate discontent and inflame animosity, which could escalate a conflict (Conteh-Morgan 2004:15).

To further explore the research question, the following sub-questions are examined:

- What is the link and relationship between climate change and food insecurity?
- How and when is violent conflict exacerbated by climate change and food insecurity?
- Can climate change and food insecurity demonstrate a proclivity for violent conflict in Ethiopia over a specific period that involves pastoralist groups?

1.5 Research aim and objectives

The aim of this research is to analyse how and where climate change and food insecurity have exacerbated the conflict in Ethiopia from 2015 to 2022.

The objectives of this research are:

- To explore how climate change and food insecurity have exacerbated conflict among pastoralists in Ethiopia from 2015 to 2022.
- To identify a region in Ethiopia where climate change induced food insecurity has intensified conflict from 2015 to 2022.
- To identify the pastoralists most affected by conflict in climate change induced food insecure regions of Ethiopia from 2015 to 2022.

1.6 Research methodology

Due to the tentative connection in the literature regarding the nexus between climate change, food insecurity and violent conflict, the research approach is explorative (Neuman 1997: 19-20). Explorative research focuses on identifying a specific phenomenon, in this case violent conflict between social groups, and how it is exacerbated by climate change and food insecurity. It is also emphasised that explorative research focuses on areas that have not been extensively researched which means that the research findings are preliminary and require further investigation.

This approach will therefore permit the following to be achieved:

- To obtain a new insight into linkages between climate change, food insecurity, and violent conflict.
- To identify the key concepts of climate change, food insecurity, and violent conflict.
- To identify the key stakeholders such as affected communities.

The research design is a literature review (Grant and Booth 2009: 97) that begins with the formulation of a conceptual framework as the scaffolding for the study. This is followed by reviewing previous scholarly work on climate change, food insecurity and the link to violent conflict. Thereafter literature will be reviewed concerning climate change and food insecurity in Ethiopia. The final component of the design entails an analysis of the aforesaid to formulate tentative conclusions whether climate change and food insecurity have exacerbated the conflict amongst specific social groups in Ethiopia from 2015 to 2022.

This study will make use of available secondary sources, as a result, it will be explorative and conducted through desktop and online research drawing from journal articles, books, online articles, editorials, and official statements. Relevant documents will be utilised exhaustively to answer the research questions on the topic. This thorough document analysis will enable the researcher to systematically recognise, arrange, and provide insight into data patterns in respect to the subject and research problem under consideration (Varpio and Kiger 2020:2).

1.7 Ethical considerations

Since there will be no human participants in the study, there will be no direct ethical risks or implications in this study. However, to enhance reliability of the data, the researcher will only use verifiable and official materials, and will also strictly observe and follow tenets of academic referencing.

1.8 Limitations and delimitations

1.8.1 Limitations: The study is limited to exploring how climate change and food insecurity have exacerbated violent conflict amongst pastoralist groups in the Somali region of Ethiopia.

1.8.2 Delimitations: This study will focus on the linkages between climate change, food insecurity and conflict among different societal groups in Ethiopia. The study will be spatially delimited to Ethiopia and temporally delimited to the period 2015-2022. Since Ethiopia is a large country, the spatial delimitation will be further narrowed down to pastoralists. The period 2015-2022 was identified because of the following reasons. Over the last seven years (from 2015-2022), Ethiopia has faced back-to-back droughts; the worst the country has experienced in over 50 years (Giovetti 2022). In 2016, 10.2 million people were reported to be in urgent need of food assistance and six years later (in the year 2022), climate change in Ethiopia continued to pose a threat, with the latest Integrated Food Security Phase Classification (IPC) analyses suggesting 12.9 million Ethiopians were in urgent need of food assistance in the year 2021 (Giovetti 2022).

1.9 Chapter outline

The proposed outline for each chapter is as follows:

Chapter 1. Introduction. This chapter covers the research theme, a review of the relevant literature, the formulation and delineation of the research problem, the research question and its sub-questions, the research methodology, the research structure, the limitations and delimitations, and the ethical considerations.

Chapter 2. Literature review. This chapter will provide a review of literature on climate change, food insecurity, conflict and pastoralists.

Chapter 3. Climate change and food insecurity in Ethiopia. This chapter will analyse how climate change and food insecurity have impacted Ethiopia. This chapter

will provide a brief historical overview of Ethiopia in relation to drought and famine. It will then provide an analysis of the impact of climate change on Ethiopia, with subsections focusing on the impact of drought in Ethiopia and the impact of climate change of climate change on agricultural productivity in Ethiopia. It will then discuss how climate change induced food insecurity has impacted Ethiopia.

Chapter 4. The impact of climate change and food insecurity on pastoralists.

This chapter will analyse pastoralist groups in the Somali region are impacted by climate change, food insecurity and conflict in Ethiopia. This chapter will first provide an overview of pastoralists in Ethiopia. It will then address how climate change has impacted pastoralists in Ethiopia. It will also address how food in security caused by impact of climate change affects pastoralist groups in Ethiopia. Lastly, it will analyse to what extent climate change and food insecurity has exacerbated conflict among pastoralists in the Somali region.

Chapter 5. Conclusion: summary and evaluation. This chapter will summarise and evaluate the research findings in order to assess if the research question and sub-questions have been answered.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The aim of this chapter is to conduct a literature review, exploring important concepts that are essential for comprehending and analysing how and where climate change and food insecurity have exacerbated the conflict in Ethiopia from 2015 to 2022. The first section will concentrate on a detailed analysis of pastoralists. Following that, an analysis of the literature on climate change will be conducted. The following section will systematically delve into the literature on the decline in livestock productivity. The next section will provide a review on declining agricultural production, including how crop yields are impacted by climate change. The review of food insecurity will be covered in the next section, along with the complex network of causes that lead to scarcity and inadequate nourishment. Finally, a comprehensive literature analysis on resource-based conflicts will be conducted, examining the conflicts resulting from the competition for scarce natural resources.

2.2 Pastoralists

Pastoralists are livestock owners who specialise in exploiting variability and regulating grazing patterns at different scales to ensure that livestock are fed more effectively than they would be without a herder (Krätli 2019). Pastoralism is a system that depends largely on the availability of water and the distribution and quality of, and access to, pasture because it is generally practised predominantly in semi-arid and arid areas where pastoralists are able to exploit land and conditions that normally cannot support other economic activities (Tofu *et al.* 2023). In addition to that, pastoralists migrate seasonally in order to ensure that livestock is fed effectively from season to season. Pastoralists therefore live a semi-nomadic life, rely primarily on livestock herding for their livelihoods, and their interactions often involve competition, mainly over grazing land and water resources (FAO 2018; Tamou *et al.* 2018). Consequently, these competitions over grazing land and water resources can lead to conflict among pastoralist communities.

Migrations of pastoralists are not restricted by national borders, these movements, back and forth across national borders have historically been generally peaceful but

conflict among pastoralists is becoming a common theme (Ward and Ruckstuhl 2017). Pastoralists have relied on strong collaboration with other users of natural resources and elaborate indigenous dispute resolving mechanisms to diffuse tensions before they degenerate into violent conflicts. For example, in a dispute over grazing land, a gathering involving the disgruntled parties is convened and the village elders mediate in order to come to an amicable resolution (Ward and Ruckstuhl 2017). However, the seasonal movement of pastoralists is under threat due to intensified conflicts and regional insecurities that are being intensified by climate change induced weather changes, and climate variability, resulting in dwindling natural resources and worsening food insecurity (Gakuria 2013).

Conflicts among pastoralists are a complex and multifaceted topic that spans different time periods, regions, and cultures that have been studied by many researchers across various disciplines, including anthropology, sociology, political science, and environmental studies. Numerous authors have attempted to elucidate the causes and dynamics of pastoralist conflicts; suggesting that many of these conflicts are based on socio-political disputes, socio-cultural differences and economic inequalities (Benjaminsen *et al.* 2012; Benjaminsen 2016; Hussein *et al.* 1999; Thébaud and Batterbury 2001; Turner 2004; Turner *et al.* 2011; Benjaminsen 2016). Since the mid-1990s, academic researchers, environmentalists, development planners, donor organisations, state institutions and the international community have gradually endorsed the idea that violent conflict is one of the major concerns in the semi-arid and arid regions of the world where pastoralism is their main source of income and sustenance (Hussein *et al.* 1999: 402). It is now an accepted fact that, the impact of climate change is aggravating the existing tensions among pastoralists; with the frequency and severity of these conflicts being on the increase, in some cases militarisation of pastoral communities is reported (Abdulahi 2005).

Establishing a thorough understanding of pastoralists and pastoralism is essential for the overall context of this study because the primary focus of this study is on pastoralist communities in Ethiopia. The primary distinctive feature of pastoralism as a way of life is the dependence on herding livestock in arid or semi-arid regions. Pastoralism's defining characteristics are their migration patterns, climate adaptability, and indigenous conflict resolution mechanisms. For this study, a solid understanding of pastoralists is essential because it provides a foundation for the investigation of how

climate change and food insecurity affect these communities. Pastoralist communities' social dynamics have significant implications on how they react to crises like food insecurity and droughts. Gaining understanding of these social systems is crucial to understanding the factors that exacerbate conflicts.

2.3 Climate change

Climate change refers to the long-term alteration in the weather patterns of the Earth, including changes in temperature, precipitation, and wind patterns, primarily due to human activities (anthropogenic activities), such as the burning of fossil fuels (in industrialisation, motorised transportation, automated agriculture) and deforestation, which lead to an increase in greenhouse gases (GHGs) in the atmosphere (IPCC 2021). Therefore the climate change of an area is due to both the anthropogenic activities and natural catastrophes (Kotir 2011). Anthropogenic activities are non-harmful human activities, but they have the potential to negatively affect society and the environment as they are the main sources of greenhouse gases (GHGs), which contribute to climate change (Ondiko *et al.* 2022). Some of the main characteristics of climate change include: rise in temperatures (IPCC 2021), changes in precipitation patterns (IPCC 2021), acidification of oceans (Doney *et al.* 2009), more frequent extreme weather events, such as hurricanes, cyclones, and wildfires; all of these cause devastating impacts on communities and ecosystems (IPCC 2021). It is evident that the rise in greenhouse gases is one of the primary drivers of climate change and is an important contributor to many of its detrimental effects. The earth's atmosphere's rising concentration of greenhouse gases is the main cause of climate change. If current emission rates of greenhouse gases continue, anthropogenic activities are likely to raise global temperatures by around 1.0°C above pre-industrial levels by 2030 and 1.5°C by 2052 (Fawzy *et al.* 2020:2069).

The increase in greenhouse gas emissions, which has accelerated climate change, is mostly due to human activity, including the burning of fossil fuels, deforestation, and industrialisation. Understanding climate change is essential to this study as it is the major environmental factor impacting the way of life of pastoralists communities in Ethiopia. These communities, already vulnerable as a result of their reliance on natural

resources, such as land for pasture and water resources, are greatly impacted by the changes in climatic conditions.

2.3.1 Droughts

Droughts are one of the costliest natural disasters in the world significantly negatively impacting the ecosystem, agriculture, and all societal groups (Gautier *et al.* 2016; Cook *et al.* 2018:165). An amplified frequency and severity of droughts is anticipated over much of the world in particular in the water-stressed semi-arid regions due to climate change (Seager *et al.* 2014). Droughts are protracted periods of very low precipitation which negatively affect ecosystems, agricultural productivity, and water availability. In Wilhite and Glantz (1985), a drought is broadly defined as an irregular moisture deficit relative to some standard baseline but is more precisely categorised based on where in the water cycle these moisture irregularities occur. Water stress and environmental changes in numerous regions of the world are anthropogenic as they are a result of human activities (Alian *et al.* 2019; Breyer *et al.* 2018; Di Baldassarre *et al.* 2017).

There are different types of droughts; the main categories being meteorological, agricultural and hydrological droughts, and these droughts have different impacts. All types of droughts are interconnected since each is merely about an abnormal moisture shortage in a section of the hydrological system relative to some reference point; whether it is in precipitation, soil moisture, or groundwater reservoirs (Cook *et al.* 2018). 'Flash droughts' are a category of soil moisture droughts, or agricultural droughts that happen exceedingly fast, with very little warning (Yuan *et al.* 2019) and have a potential of serious repercussions for agricultural output. Recently, there has been a significant increase in such flash droughts in the US, China and South Africa (Cook *et al.* 2018). For now, several of the most disastrous droughts in the world are still occurring in East Africa (Haile *et al.* 2019). As a result of a lack in record of observations, large uncertainties and large natural variability; particularly of precipitation, no drought has been directly linked to climate change (Uhe *et al.* 2018; Philip *et al.* 2018; Kew *et al.* 2021). There are different causes of droughts, ranging from natural ones like changes in weather patterns to man-made ones like deforestation and over utilisation of water resources. There is evidence that anthropogenic warming of the surface temperatures of the Western Pacific ocean may

contribute to more frequent droughts is limited (Funk 2012; Funk *et al.* 2019). The reduced precipitation during the main rainy season of this region is probably connected to climate change (Tierney *et al.* 2015; Hoell *et al.* 2017).

Approximately 690 million people world-wide were undernourished in 2019. Food insecurity, together with climate-related shocks, such as drought, is linked to conflict (FAO 2020). The regions of the world most vulnerable to droughts are the least food secure regions and therefore, any intensification in the severity of drought due to climate change, greatly affects these regions. In Brazil for instance, the drought that has continued since 2019 has resulted in water scarcity, huge losses in crop productivity, including corn and coffee productivity, as well as increased incidence of wild fires in the Amazon (Marengo *et al.* 2021). On the other hand, in East Africa, since 2005 there has been an increase in droughts that have led to significant deaths of livestock, interruption of livelihoods and increasing prices of food (Nicholson 2017; Haile *et al.* 2019). The spread of droughts across water-scarce regions is generally extremely costly as it negatively affects ecosystems, agriculture and the broader society such as soil degradation and crop failure (Cook *et al.* 2018).

Droughts are especially pertinent to this study because of their direct connection to resource scarcity and food insecurity. Long-lasting droughts can have a detrimental effect on pastoralist communities' traditional way of life by reducing crop yields, causing water shortages, and creating a shortage of pasture for livestock. Providing an explanation of droughts is essential since it will help in understanding the various environmental stresses that pastoralist communities, such as those in Ethiopia, frequently encounter. These communities depend heavily on natural resources for their sustenance, making them especially vulnerable to droughts. In addition to that, it is imperative to understand the relationship between droughts and climate change as climate change is known to increase the frequency and severity of droughts in the area. Droughts brought about by climate change directly add to shortages in water supply, food insecurity and competing for natural resources among pastoralists communities.

2.4 Declining livestock productivity

Climate change has a negative impact on livestock productivity. Variations in temperatures lead to marked effects on the reproductive performance of livestock, for instance reduced fertility, conception rates, and longevity. According to Khan *et al.* (2023), heat stress and humidity change the physiology of livestock, thereby causing the livestock to be more vulnerable to diseases and stress. The availability and quality of pastures are diminished during the dry seasons, so much that livestock are not able to meet their energy requirements for the maintenance of their body weight. The inability of livestock to meet their energy requirements results in losses in body weight and reduced milk yields (Hidoso and Guyo 2017:2). Another livestock performance parameter affected by the climate change is growth. Heat stress suffered by livestock leads to loss of appetite and hence reduced feed intake and consequently poor growth performance (Galmessa 2013). High temperatures lead to heat stress among ruminants and significantly reduced appetite, therefore low feed intake due to increased heat stress which results in poor quality livestock and livestock products (Yadav *et al.* 2013; Kadzere *et al.* 2002). Furthermore, numerous studies mention that, extreme weather events, for example cyclones, floods, and droughts directly impact livestock by increasing morbidity and mortality rates (Joshi 2013). The impacts of climate change on livestock production can therefore be explained as being linked to livestock performance parameters such as, daily weight gain, feed conversion efficiency, milk yields and milk quality (Hristov *et al.* 2018). Consequently, the inability of livestock to both maintain a healthy body weight and develop properly, as well as a decline in fertility due to climate change, predispose livestock to diseases.

Climate change threatens human and animal health by either increasing the severity or frequency of outbreaks of known diseases, or by enabling the emergence of novel diseases. Increasing temperatures or the increasing severity and frequency of extreme weather events might similarly affect animal health either directly or indirectly (Bett *et al.* 2017). Bekele (2017:55) states that, climate change can have an effect on infectious diseases through alterations in the pathogens, and elevated temperatures could intensify the speed of increase in numbers of pathogens or parasites. Amongst the direct effects of climate change on livestock diseases, are the higher temperatures and alteration in rainfall patterns, resulting in an accelerated transmission of current vector-borne diseases and macro parasites of livestock and also resulting in the

emergence and spread of novel diseases (diseases that were not present before), for example, a spread in Trypanosomiasis in livestock.

The effects of climate change on livestock health are mostly expressed in terms of severity and distribution, and described as either direct or indirect. Direct impacts on livestock health are mostly due to exposure to higher temperatures and humidity (Escarcha *et al.* 2018:10). The foremost direct impacts of climate change on livestock health described include reduced immunity to infections due to, for example, heat stress, increased rates of multiplication of pathogens, and increased occurrence of infectious diseases, corresponding with the duration of the extreme weather events (Brett *et al.* 2017; Forman *et al.* 2008). Indirect impacts of climate change on livestock diseases are ascribed to alterations in temperature and precipitation patterns, which when combined lead to an increase in the stubbornness and large quantities of disease vectors and parasites, host resistance to infection mediators, and alterations in the severity of human–livestock diseases (Özkan *et al.* 2016; Gethings *et al.* 2015). It should be furthermore noted that the economic aspect of livestock production also suffers as a result of heat stress and infectious diseases brought about by climate change.

As a consequence, the economic effects of climate change on livestock production are due to the poor performance of livestock, and these economic impacts are related to impacts of climate change on other aspects of livestock production, for instance in fodder production and health. Economic losses in for instance pastoral systems are typically associated with inferior livestock performance as a result of the inadequacy of fodder due to droughts (Oyekale 2014). Recurring economic losses in pastoral systems are causing increases in livelihood risks and food security risks for countless pastoral households in Africa (Martin *et al.* 2014; Kuczynski *et al.* 2011).

Declining livestock productivity refers to a reduction in reproductive performance of livestock for instance reduced fertility, conception rates, and longevity. Declining livestock productivity is caused by a number of factors, with climate change being one of the primary factors. In pastoralist communities, where the productivity of livestock is crucial to livelihoods, a decrease in livestock productivity can result in decreased food availability, inadequate nutrition, and a higher risk of hunger and malnourishment. These communities are particularly vulnerable to the effects of decreased livestock

productivity because their traditional ways of life are closely linked to their livestock. Therefore, understanding declining livestock productivity is focal to this study, because it provides a framework for comprehending the multifaceted problems that pastoralist communities in Ethiopia face and can lead to the exacerbation of conflict.

2.5 Declining agricultural productivity

Rising temperatures due to climate change have a negative impact on agricultural productivity. The resultant global warming has been one of the major threats to primary agricultural production for the past few decades, because the sector is particularly susceptible to climatic conditions (Khan *et al.* 2023). The rising global temperatures due to the increasing greenhouse gas emissions have led to changes in temperature patterns and rainfall patterns, consequently affecting the growth and development of crops and crop yields, as well as livestock productivity (Mendelsohn and Dinar 2009). Climate change, mainly driven by anthropogenic activities, is therefore one of the most critical global challenges of the 21st century due to its negative effects on the environment; with agricultural productivity being one of the most critical areas mostly affected (Nastis *et al.* 2012; Mendelsohn and Dinar 2009).

Climate change, through increase in temperatures, plays a major role in reducing crop yields. Limited availability of water due to the effects of climate change, causes crop yields to be significantly lower and this eventually negatively affects food security (Olabanji *et al.* 2020:1). The effects of increasing temperatures, variations in precipitation, and carbon dioxide (CO₂) fertilisation differ depending on the type of crop, locality, and extent of change in the parameters. Results of a study by Hopkins and Del Prado (2007) showed that rises in temperature, carbon dioxide levels and nitrogen deposition reduced primary production in pastures. Increase in temperatures is reported to reduce crop yields, while increase in precipitation probably offsets or reduces the effect of temperature increases (Malhi *et al.* 2021:6). Severe droughts are projected for most of the regions of the world, with drought-affected areas estimated to increase from 15.4 to 44.0% by the year 2100 as a result of climate change. It is expected that in drought prone areas, the yield of major crops will decrease by more than 50% by the year 2050 and by nearly 90% by the year 2100 (Li *et al.* 2009). For

this reason, a decline in crop yields due to climate change will result in a decline in the quality and quantity of fodder.

Impacts of climate change on fodder are usually defined in terms of quantity and quality of the fodder (Thornton *et al.* 2009; Rojas-Downing *et al.* 2017). Deteriorations in quantity of pasture, rangeland, and in the production of fodder crops are largely said to be a result of elevated temperatures and droughts (Sautier *et al.* 2013; Wheeler and Reynolds 2013). Changing climate conditions lead to shifts in vegetation; reducing the availability and quality of forage for grazing animals (Collier *et al.* 2019, Nardone *et al.* 2006). A shift in seasonal patterns, from hotter and more arid climates, causes substantial reductions in forage crop yields and alterations in the successive patterns of grassland production and grazing systems (Lunt *et al.* 2012; Ghahramani *et al.* 2019). Rising temperatures reduce pasture productivity, resulting in an inferior quality of fodder species (Leister *et al.* 2015; Polley *et al.* 2013). A study by Tubiello *et al.* (2007) on the evaluation of climate change impact on quality of forage species showed that elevated temperatures intensify lignification of plant tissues and therefore reduce the digestibility of fodder, and at the same time, high temperatures also negatively impacting the supply of fodder. Likewise, Giridhar and Samireddypalle (2015) also add that increased temperatures are linked to greater lignification of plant tissues and reduced digestibility of fodder, thereby impacting the supply of fodder directly. As a result, the reduction in the digestibility of fodder negatively impacts the health and the feeding of livestock.

A decline in the quality and quantity of fodder has numerous detrimental consequences for livestock. For example, an inferior quality of fodder means that livestock may not be able to meet or satisfy their energy needs which are required to maintain their body weight (Lee *et al.* 2017). In addition, reduced forage quality implies that the quality of livestock nutrition is negatively affected, translating into low productivity, and declining meat and milk production (Rojas-Downing *et al.* 2017). Climate change negatively affects livestock production through biodiversity loss, decreased quantity and quality of fodder, the emergence of various livestock diseases, and heat stress, challenging the increasing demand for livestock products and hence competition for natural resources (Garnett 2009). Droughts are the main driver of a decline in the quality and quantity of fodder and pastures.

Nkondze *et al.* (2014:5) report that drought conditions and a delay in the start of the rainy season's rains leads to reduced regeneration of fodder grass, water shortage, heat stress on livestock, consequently leading to increased mortality of livestock, susceptibility to diseases and physical deterioration due to long distances that livestock have to walk to get drinking water and pastures for grazing. Dahal (2011) reports that due to severe drought, growth of edible grass species and regeneration of fodder species in pasture and forest fodder diminishes as a result of decreased rainfall amounts thereby causing deficiencies in the diversity and quality of livestock fodder. This is in agreement with Cheng *et al.* (2022:5) who also reported that climate change affects grass fodder supplies. With reference to grasslands and pastures, upsurges in average temperatures cause substantial alterations in pasture composition, patterns, and biome distribution.

Increase in temperature can also lead to crops species being vulnerable to disease infections thus negatively impacting fodder supplies. Godde *et al.* (2021:3), state that susceptibility of crop species to climate changes depends on the type of crops and a variety of environmental factors, nonetheless, it remains strongly agreed that air temperatures higher than about 30°C - 34°C largely reduce cereal yields in water-stressed growth environments, by rushing crop development and damaging plant cells. Plant pests, in the form of insects and diseases, are the cause of major losses in crop yields, and these losses could be worsened by climate change; with annual reduction in crop yields that could be in the range of 20 to 40% (Flood 2010). Global losses in crop yields are expected to furthermore increase by between 10 to 25% for every degree of global surface temperature rise. Increasing temperatures might impact distribution, severity of incursion and life cycles of cold-blooded pest species or these higher temperatures might decrease the resistance of crops or fodder species to disease (Uddin and Kebeab 2020).

The aforementioned facts underscore the complex and multi-faceted nature of the impact of climate change on agricultural productivity and the consequences on humans. Droughts and floods (the two major consequences of climate change) disrupt planting and harvesting schedules, impair soil quality, and increase the prevalence of both plant and livestock pests and diseases leading to poor crop harvests and hence negative consequences on food security. Giving an explanation for the declining agricultural productivity is important to this study, as it will provide a foundational

understanding of one of the primary challenges faced by pastoralist communities in Ethiopia that can lead to the exacerbation of conflict.

2.6 Food Insecurity

The definition of food insecurity is founded on the universal understanding that, hunger or limited nutrient availability, that provokes the perception of hunger, is not the only socially significant feature of deficiency in food nutrients. According to Alaimo (2005:282), food insecurity includes the concepts of accessibility, availability, and food safety and the societal connotation of approaches used to get food. The FAO has classified food insecurity into the following three major categories: firstly, acute food insecurity: defined as severe hunger and malnutrition to the extent that lives are significantly and immediately threatened (e.g., in famine), secondly, occasional food insecurity: defined as food insecurity due to a specific temporary circumstance, and finally chronic food insecurity: which is a consistent or permanent threat to food security (Ahmad *et al.* 2021:107).

Thus, politically, food insecurity is a multi-dimensional issue that interconnects the various aspects of politics, policy-making, and governance (Bruzelius 2022). The adherents of this viewpoint of food insecurity promote focus on the role of government policies in shaping food systems, access, availability, and affordability to all.

The economic standpoint is another important viewpoint of food insecurity. Food insecurity, according to the economic viewpoint, is often rooted in complex economic factors such as poverty, income inequality, and lack of access to resources and the understanding of these causes and how they are interlinked is crucial for addressing the issue of food insecurity (Barrett 2010; Duflo 2012). Thus, the economic viewpoint focuses on causes of food insecurity, its consequences, and potential solutions.

Poverty, where individuals and households lack the financial means to purchase adequate food is a contributing economic factor to food insecurity. Income inequality exacerbates food insecurity, leading to disparities in access to food resources (Gundersen and Ziliak 2014). Structural factors, such as unemployment and lack of support structure for self-development, low wages and unstable employment can lead to, for example, inadequate income to afford sufficient, nutritious food, and thus

contributes to food insecurity by limiting individuals' ability to generate income and afford healthy and nutritious food (Loopstra *et al.* 2015; Loopstra and Tarasul 2013).

The environmental, sustainability and agricultural opinions on food insecurity in the literature focus on the importance of agricultural practices, which may aggravate or mitigate food insecurity. Sustainable agricultural practices and food production systems that promote investment in agricultural research and technologies to increase food production while minimising environmental impact, can in the long-term combat food insecurity (Tiftonell and Giller 2013). The integration of ecological principles into agricultural systems, which promote biodiversity, soil health, and efficient resource use, lead to increased agricultural productivity and enhanced resilience to environmental changes. Sustainable agricultural practices can help mitigate and adapt to the impacts of climate change, such as extreme weather events, droughts, and shifts in growing seasons (Nicolétis *et al.* 2019; Pretty *et al.* 2011).

Food insecurity is a complex and multifaceted issue that has significant wide and far-reaching implications, that span across political, economic, sociological, health and environmental perspectives. Thus, food insecurity is not solely a matter of agricultural production and resource availability, it is profoundly intertwined with political socio-cultural decisions and structures. These factors can either exacerbate or mitigate food insecurity, and addressing the issue of food insecurity would require an all-inclusive understanding and interplay of these dynamics.

2.7 Resource-based conflicts

Resource-based conflicts, also referred to as natural resource conflicts, are conflicts that arise due to the competition of natural resources. Natural resources refer to any non-artificial products that can be extracted, harvested, or utilised. These include land, precious minerals, petroleum, water, water resources, and livestock. They can be found in or under the soil and may be utilised for economic gain or other beneficial purposes for humanity (Ajodo-Adebanjoko 2019:57). This study will primarily focus on resourced based conflict over land for pasture and water resources. According to Assal (2006:102), resource-based conflicts can take many forms and transcend a range of frontiers, including ethnic, regional, and national ones. Due to the complexity

of these conflicts, their parameters are shifting and they are not limited to any one place.

Literature on resource-based conflicts can be categorised under two debates or viewpoints. One subscribes to the notion that the abundance of natural resources can lead to conflict, while the other subscribes to the notion that the scarcity of natural resources can lead to conflict. Mildner *et al.* (2011:157), state that there are two main areas of focus, one explores the link between resource scarcity and conflict, while the other examines the link between resource abundance and conflict. Vesco *et al.* (2020:2) further explains this by adding that, when a resource is scarce, the likelihood of violence is higher; on the other hand, when a resource is abundant, this can also lead to a higher likelihood of violent conflict.

This study will focus on resource scarcity conflicts. Resource scarcity and conflict are positively correlated, according to academics like Homer-Dixon (1994), Hauge and Ellingsen (1998), Raleigh and Urdal (2007), and Urdal (2008). They claim that when people lose their means of support, they have no choice but to fight for their lives. They subscribe to the neo-Malthusian assumption that because populations are expanding more quickly than food supplies, there will be a corresponding decrease in the natural resources available. Competition is brought on as a result, which leads to conflicts over survival strategies. Resource scarcity that is brought about by an increase in the population or changes to the environment will almost certainly exacerbate the disparity between the rich and the poor and worsen economic conditions, which will lead to further inequality and societal fragmentation (Homer-Dixon 1999).

Agricultural land, vegetation, livestock, cultivation of crops, and water are examples of renewable resources that may also be linked to a higher risk of conflict. The absence of renewable resources can fuel political unrest as well, especially in unstable environments marked by demographic pressures and economic stresses (Raleigh and Urdal 2007; Almer *et al.* 2017). In addition to that, resource scarcity has the potential to create or exacerbate already present societal dissatisfaction (Theisen 2017), particularly in agriculturally dependent communities (Von Uexkull *et al.* 2016) or ethnically fragmented communities (Von Uexkull 2014; Schleussner *et al.* 2016). It can also cause agricultural collapses, increase food prices, cause livelihood deterioration, and result in a variety of other adverse consequences. The decline in livelihood brought on by resource scarcity can therefore compel migration from the most prone

places in search of improved standards of living, particularly in the absence of viable alternate sources of income (Adger *et al.* 2015). Resource scarcity can disrupt political and institutional structures by reducing agricultural productivity, slowing economic growth, and increasing social dissatisfaction; as a result, governments may not have the resources necessary to mitigate the public's discontent (Kelley *et al.* 2015).

Given the fact that the literature on resources and conflict was first published in the 1980s, it has recently returned to the forefront of academic discussion as a result of an increased focus on the security implications of climate change. Research on the effects of weather shocks and temperature and rainfall abnormalities brought on by climate change is fast expanding (Gleditsch 2012; Hsiang *et al.* 2013; Hsiang and Burke 2014; Buhaug *et al.* 2015; Buhaug 2016). Climate change is anticipated to enhance the likelihood of conflict through a number of indirect channels, such as by its impact on the distribution and availability of natural resources (IPCC 2014). Additionally, depending on the specific circumstances they act upon, climatic shocks will have a more or less disruptive effect (Koubi 2019).

The relationships between semi-nomadic pastoralists and rural communities of mainly peasant farmers and herder-farmers, who have historically shared landscapes and resources, are deteriorating due to the increasing impact of climate change which has created conditions for violent conflict (Brottem and McDonnell 2020). Conflicts over land and water resources in many areas have long been a socio-political concern in countries where there is a large community of pastoralists in the colonial and post-independence eras. However, these conflicts have gained prominence in the last few decades due to the ongoing spread of fierce violence, instability, and displacement of people across many regions (Penu and Paalo 2021).

This study will focus on resource scarcity conflicts within the specific context of pastoralist communities in Ethiopia. This is because a sizable portion of Ethiopia's population is pastoralist, and their way of life is linked to the use of natural resources. For these communities, the lack of natural resources such as water and pasture presents a constant and urgent problem.

2.5 Conclusion

This literature review offers an in-depth structure for comprehending the complex interplay between climate change, food insecurity, and conflict in pastoralist communities. Pastoralism is the practice of herding livestock through arid or semi-arid environments, characterized by migratory patterns, climate adaptation, and traditional conflict resolution processes. Pastoralist communities are seriously threatened by climate change, which is brought on by an increase in greenhouse gas concentrations from human activity. Droughts, exacerbated worse by climate change, have a direct effect on the availability of resources, worsens food insecurity, and escalates competition amongst pastoralist communities for natural resources as mentioned in Chapter 1. This part of the literature review emphasises the significance of comprehending droughts, which are protracted low-precipitation events that have detrimental effects on ecosystems, the agricultural sector, and availability of water. The pastoralist communities of are highly dependent on natural resources, making droughts a significant environmental stressor. Water scarcity, food insecurity, and increased competition for resources among pastoralist are directly caused by both the severity and frequency of droughts becoming more prevalent as a result of climate change. A further important aspect of this literature review that is worth mentioning is the close link between climate change and declining livestock productivity. Pastoralist communities are directly affected by changes in grazing patterns, decreased fertility of livestock, and higher susceptibility to diseases. Due to the heavy reliance on livestock, lower productivity results in insufficient sustenance, increased food insecurity, and a higher risk of hunger and malnourishment. The literature review also explored resource-based conflicts, stressing that competition for natural resources is a major cause of conflicts. A recurring problem for pastoralist communities is the lack of resources, particularly pasture and water. Thus, this literature review has established the foundation for comprehending the intricate impacts of food insecurity and climate change on human livelihoods, agricultural output, and the ensuing rise in conflicts among pastoralist communities.

CHAPTER 3: CLIMATE CHANGE AND FOOD INSECURITY IN ETHIOPIA

3.1 Introduction

Ethiopia's semi-arid and arid lowlands are particularly vulnerable to climate change and a majority of its inhabitants are greatly dependent on rainfed agriculture together with their livestock. The aim of this chapter is to analyse how climate change and food insecurity have impacted Ethiopia. The chapter will begin with a historical overview of droughts and famines in Ethiopia by exploring recurrent challenges that are brought about by drought and famine in Ethiopia. The subsequent sections will then discuss the impact on climate change in Ethiopia. It will then be followed by a section that addresses the impact of droughts in Ethiopia. The next section will address the impact of climate change on livestock in Ethiopia particularly focusing on declining pastures and feed and livestock productivity in next section. Lastly, climate change and food insecurity will be discussed, ultimately leading to a comprehensive understanding of the difficulties encountered by the region.

3.2 Historical overview of droughts and famine in Ethiopia

Drought and famine are controlling dynamics that influenced the governance of Ethiopia during the past few decades. Following the oil price shocks of 1973, the drought and famine that struck northern Shewa, Welo, and Tigray in 1973-1974 revealed the ineffectiveness and incapacity of Haile Selassie's aging government to handle the crisis. In this dire situation, numerous impoverished rural residents migrated to urban areas in search of government assistance, but unfortunately, no help was extended to them (Stark *et al.* 2011).

There were four critical incidents of climate change that occurred in the 1970s and the 1980s in Ethiopia. The first two years of the 1970s, that is, 1972 – 1973 can be considered as the first incident. A study by Sethi (2018:6) observes that, the famine that was experienced in the region of Wollo in northern Ethiopia began in the early 1970s due to drought. In addition to that, throughout that decade, the drought also played a significant part in the increase in starvation in that area and across the nation. Kumar (1990:181) concurs with the study by Sethi (2018), and also adds that despite

the fact that the 1971 meher rains, which are necessary for the main crops such as teff, wheat, maize, sorghum, and barley failed, the 1972 – 1974 famine was caused by unfavourable production conditions brought on by ongoing droughts that began in 1964 – 1965, when a famine had already impacted most of the Wollo region. During this period the regions of the north, and especially the province of Wollo experienced extremely bad and recurrent crop failures and that plunged the region into famine. This was followed by the famine of 1973 – 1975, during which time the famine shifted south and affected mainly the province of Harerghe. Much of the hardships, poverty and deaths occurred in this area (Rivers *et al.* 1976; Seaman *et al.* 1978). Furthermore, the effects of these droughts and famines negatively impacted the lives and livelihoods of pastoralists.

The severity of the drought and famine forced the pastoralists to migrate to areas with water resources and pasture due to lack of pasture for their herds of cattle, sheep and goats. The high mortality records among the pastoralist communities were associated with scarcity of food, especially since this was combined with a lower herd size (Rivers *et al.* 1976: 354) seemingly in search of relief shelters. Then, it was the famine of 1982 -1985, whose origins actually can be traced back to the intermittent food crises of the 1970s, which was heightened by the effects of the Ogaden conflict of 1977-1978. The effects were such that the social shock caused by the military takeover and the devastating effects of the civil war, which the regime was waging against the separatist forces in the north of the country, also contributed to increasing of the country's vulnerability to the ravages caused by endemic food shortages (Kumar 1990:191). Essentially, in the 1980s the famine was caused by a confluence of unfavourable circumstances, including recurring droughts, poor harvests, food shortages the conflict that prevented humanitarian aid from accessing those living in occupied territory, and government policies that relocated communities and directed relief efforts to specific regions (World Vision 2023).

The provided historical overview of droughts and famine in Ethiopia clarifies the intricate dynamics of famines, droughts, governance, and social reactions in Ethiopia in the 1970s and 1980s. Providing a historical overview is extremely pertinent for a study that seeks to analyse how climate change and food insecurity exacerbate

conflict among pastoralist communities in Ethiopia. The historical background provided in this section demonstrates the significant influence that famines caused by droughts have had on the nation's governance. It highlights the grave consequences of climate-induced problems on the populace. This overview highlights the reality that a complex interaction of causes, such as recurrent droughts, conflict, poor harvests, and government policies, contributed to the 1980s famine. It emphasises the complexity of the difficulties Ethiopia encountered at the time and can serve as a useful method of for analysing contemporary issues concerning climate change and food insecurity. The historical overview also clarifies how past climate change related disasters have affected societal dynamics and governance and accentuates the significance of taking into account multiple factors that can intensify conflict during times of food insecurity.

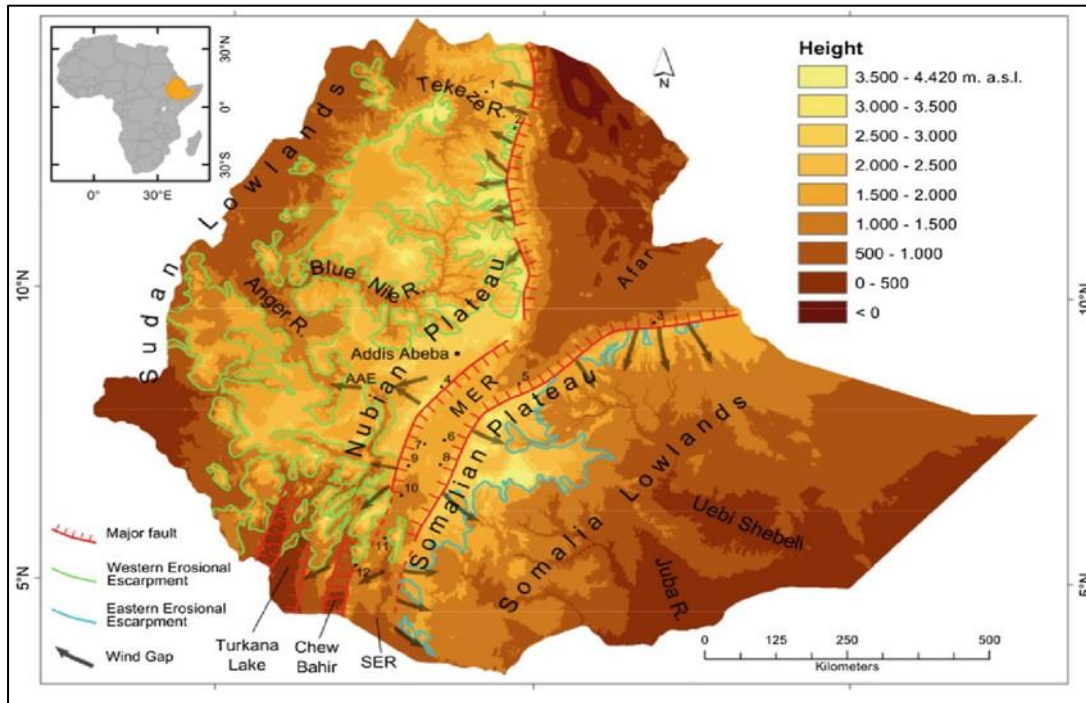
3.3 Climate change impact on Ethiopia

The unique and diverse climatic and agro-ecological zones of Ethiopia have a significant impact on food production. The variations in temperature, precipitation, and elevation influence the types of crops that can be grown, the timing of planting and harvesting, and the prevalence of certain agricultural techniques. Additionally, the vulnerability of certain regions to climate-related challenges like droughts, floods, and soil erosion affect food security and livelihoods (Osman *et al.* 2021) due to the nation's over reliance on the agricultural sector as a source of livelihood.

Ethiopia is one of the most impoverished nations in the world and agriculture plays a major role in the country's economy (Baye 2017) and the natural resources required for subsistence (Zegeye 2018). In Ethiopia, 80% of the populace live in rural areas and depend on small-scale subsistence agriculture, therefore food and livelihood are inextricably tied to the exploitation of natural resources such as land and water resources (Wassie 2020:3). Ethiopia is extremely susceptible to climate change, due to its geographical setting, terrain, and low adaptive capacity and in turn, traditional agriculture depends on nature (Mekonnen *et al.* 2021:2; Kourouma *et al.* 2022; Mohammed *et al.* 2022). The lowlands house the majority of Ethiopia's land for livestock grazing, while the highlands are predominantly home to subsistence farms as illustrated in Figure 2 (Headey *et al.* 2014). Ethiopia is mainly characterised as an

arid and semi-arid country with high precipitation variability (Kourouma *et al.* 2022). Consequently, the agricultural sector is negatively impacted.

Figure 2. Topography of Ethiopia



(Cortorti *et al.* 2015)

The prediction of rainfall and drought patterns are becoming less reliable, due to the impacts of climate change. The irregular rainfall patterns are causing a decrease in crop yields in Ethiopia, and the regions most affected are the arid and semi-arid zone such as in the Somalia Lowlands in Figure 2 (Osman *et al.* 2021). Furthermore, reports on the dire climate situation in Ethiopia also show how the below average rainfall amount (480 mm) recorded in 2015 was due to the low rainfalls recorded during both the *belg* (February–May) and the *kiremt* (June–September) seasons. During the *belg* (short rainy season) 357 mm were recorded, and during the *kiremt* (main rainy season) 436.9 mm were recorded (Alemu and Desta 2017; Legese *et al.* 2018). At the beginning of June 2015, the government declared that the *belg* season was a failure and, the instituted verifying checks that ended in August recorded that 4.5 million people needed food assistance (Eewbank *et al.* 2019:347-348). In the same year cereal yields from the *kiremt* season were also very low (at 45% lower than on the previous year, 2014) in Dire Dawa in the eastern part of the country, which resulted in 8.2 million people being in need of food assistance by mid-October and that number

increased to 10.1 million people at the end of December of 2015 (Eewbank *et al.* 2019:347-348).

Emiru *et al.* (2022), reported that the Upper Awash River Basin covers approximately 11,430 km² and is situated in Ethiopia's North West Rift Valley. The Awash River rises to an elevation of more than 3000 metres on the high plateau close to Ginchi town, west of Addis Ababa and flows for a total distance of 336 km. The two important seasons of *belg* and *kiremt* are when the river basin receives the majority of its precipitation and therefore agricultural productivity is significantly impacted by declining precipitation. Berhane and Tesfay (2020) also add that the Upper Awash River Basin, one of Ethiopia's primary agricultural regions, is being affected by the *El Niño* and *La Nina*. The *El Niño* phenomenon is a warming of the central to eastern tropical Pacific Ocean that occurs every two to seven years. *La Niña* causes the Pacific Ocean surface temperatures to cool down as winds strengthen and blow warm waters towards the west. *La Niña* is therefore an opposite of *El Niño*; being an intensification of normal weather patterns (Hardiman *et al.* 2019). During an *El Niño* event, surface temperatures across the Pacific Ocean can increase by 3–5°C above average, for a period from anytime between a few months to two years. The *belg* and *kiremt* are incredibly significant in this region, because more than 95% of the region's crop output occurs during these seasons. A decline in precipitation and increasing temperatures in the region reduced agricultural production levels significantly (Berhane and Tesfay 2020).

Climate change and unpredictability have increased the frequency of droughts, floods, heat waves, heavy rains, and high winds in Ethiopia. According to Habte *et al.* (2022:2), the nation is experiencing the negative effects of climate change, including an increase in average surface temperature, altered rainfall patterns, recurring droughts, *El Niño's* Southern Oscillation (ENSO), floods, and *La Niña*. Studies show how climate change induced by *El-Niño* has increased the average temperatures and this has affected rainfall patterns in Ethiopia (Bogale and Temesgen 2021:2). According to the World Bank, Ethiopia has recorded an increase in temperatures by an average of 1°C since 1960, at an average rate of 0.25°C per decade, most noticeably from July through to September (World Bank 2021:6). If there is moisture available for evaporation, abnormally high temperatures will result in faster rates of evaporation and drier surface conditions. Droughts in Ethiopia are not just a result of

rising temperatures (Philip *et al.* 2018). However, the increase in temperature is one of the factors that result in prolonged droughts and shortages of food resulting in food insecurity.

Due to climatic change, Ethiopia has been suffering from high temperatures, prolonged droughts, and scarcity of food (World Bank 2017; World Bank 2021). The Ethiopian economy in general and the country's agriculture have suffered significantly as a result of recurrent droughts and flooding (World Bank 2017). Its variable local climate ranges from equatorial rainforest with heavy rainfall and humidity in the south and southwest to desert-like conditions in the north-east, east, and south-east lowlands due to differences in altitudes, land areas, and topography (Ginbo 2022:2). The primary agroecological zones in the country, notably Kolla (areas below 1,500 m altitude), Woinadega (1,500-2,300 m), and Dega (above 2,300 m), differ significantly across different locations in terms of fluctuations in temperature and precipitation patterns (Esayas *et al.* 2018; Taye *et al.* 2019). In the northern and central-eastern regions of Ethiopia, for instance, seasonal rainfall shows a significant declining trend (up to 100 mm), while the north-eastern and south-western regions show a significant increasing trend (up to +60 mm) (Gebrechorkos *et al.* 2019). Additionally, the southern and eastern portions of Ethiopia frequently experience intense droughts, while the western regions of Ethiopia experience food shortages (World Bank 2021).

This section emphasised the crucial connection that exists in Ethiopia between agriculture, food security, and climate change. Ethiopia, where 80% of people live in rural areas and the country is heavily dependent on agriculture, underscores the fundamental link between utilisation of natural resources, especially water and land, and livelihoods. It is evident that Ethiopia is vulnerable to climate change because of its topography, geographic location, and inadequate capacity for adaptation. Reduced crop yields are the outcome of changing patterns of rainfall caused by climate change, particularly in dry and semi-arid areas of the nation. In addition to that, there has been an increase in the frequency of extreme weather events such as heatwaves, floods, and droughts. The impact of El Niño has caused changes in temperature and precipitation, which have exacerbated food shortages and economic hardships. This contextual understanding is essential to the study as it provides a foundation for

examining the links between climate change, food insecurity and conflict among pastoralist communities in Ethiopia.

3.4 Impact of droughts in Ethiopia

Ethiopia has had severe drought occurrences, the majority of which covered the whole nation (Edossa *et al.* 2010; Viste *et al.* 2013). These events happened in 2011, 2012, 2014, and 2015. According to Gebrehiwot *et al.* (2011) stated that Ethiopia, a country with a huge population whose economy is heavily dependent on rainfed agriculture. Ethiopia's annual rainfall varies geographically. The average annual rainfall in the arid and semi-arid lowlands is between 115 -165 mm, whereas it exceeds 1700 mm in the north and south-west. Extreme droughts often happen during the long growing season, *kiremt*, while the rainfall, which has become unpredictable, happens during the short growing season, *belg* (Conway and Schipper 2011). Droughts therefore impact every aspect of life in Ethiopia.

In the past, droughts in Ethiopia have affected almost every industry, including agriculture (losses of crops and livestock), water resources (increased evaporation and decreased availability of fresh water, causing water stress), inadequate water supply for the business world, and decreased generation of electricity (from hydropower) (Bogale and Erena 2022:474). Droughts are a significant climatic risk that endanger Ethiopia's long-term viability and have been a persistent problem for the nation (Meze-Hausken 2004; Mersha and van Laerhoven 2018). Although there are droughts everywhere, they are not as common or as severe as they are in Africa, particularly in Ethiopia (Mekuyie *et al.* 2018). According to Wassie *et al.* (2023:2), Ethiopia is very susceptible to drought, with more than a 40% yearly probability of moderate to severe droughts occurring during the rainy season. As a result, drought has historically been the nation's most serious disaster. Mekonen and Berlie (2021) also note that a combination of predicted climate change, rapid population growth, a shortage of arable land and the cultivation of marginal lands, land overexploitation, a lack of appropriate soil and water conservation techniques, and water stress and droughts have become more frequent in Ethiopia. Droughts affected different regions of Ethiopia between 1950 and 2017, showing that meteorological droughts occurred every two years (Mera 2018). While some of the droughts lasted shorter durations,

lasting less than a year, while others persisted for three years or longer. In addition, terrible famines and malnutrition frequently follow droughts (Asfaw 2021) consequently resulting in food insecurity in the country.

A significant portion of Ethiopia's populace suffers from chronic and transitory food insecurity, severe, persistent food shortages and famine, which are linked to recurrent droughts brought about by climate change (Mekonnen *et al.* 2021:2; Magrath 2015:5). These droughts have been recurring in regions characterised as arid or semi-arid (Alemu and Mengistu 2019:400), mainly in eastern (Magrath 2015:5) and north-eastern areas of the country which received a total average rainfall of 480 mm between March and September of 2015; the lowest recorded in 50 years, resulting in a 35% per capita drop in water availability (Ewbank *et al.* 2019:347-348).

Ethiopia has suffered severe and continuous socioeconomic and environmental effects of persistent droughts. According to Wassie *et al.* (2023:2), compared to other natural disasters, droughts are known to result in a greater number of fatalities, resource disruptions, and evictions from houses. However, agriculture suffers the most (approximately 84%) losses and damage as a result of droughts. Drought conditions, mainly in the eastern parts of Ethiopia, resulted in crop failures ranging from 50 to 90%, death of thousands of livestock, and malnutrition in the communities (Magrath 2015:5). There is evidence that climate change, particularly rainfall unpredictability, is the primary cause of Ethiopia's persistent droughts, along with the related food insecurity and famine (Seleshi and Zanke 2004; Bezu 2020:70).

Ethiopia has extreme and recurrent droughts about every two to three years, which have a negative impact on the economy and rural communities. Due to its extensive reliance on rainfed agriculture, droughts can occur during both *kiremt and belg* seasons making it more vulnerable to these climate-induced catastrophes. The significant annual fluctuations in precipitation across the nation exacerbate the impacts of drought, especially regarding food production and people's livelihoods. One of the most dangerous natural disasters in Ethiopia is drought, which has a high probability of occurring throughout the rainy season in varying degrees. The problem has a close connection to land scarcity, overexploitation of land, increasing population growth, and climate change, resulting in the frequency of droughts. A key consequence that largely affects arid and semi-arid regions is food insecurity, which is characterised by both temporary and chronic shortages, famine, and instability. The

periodic droughts have serious negative effects on the ecosystem and society, causing massive losses, disruptions to resources, and deaths.

3.5 Impact of climate change on livestock in Ethiopia

Pastoralists in Ethiopia are extremely vulnerable to the impacts of climate change. According to Al-Amin and Alam (2011), the effects of climate change are closely related to ecosystem health and animal health. Due to their reliance on livestock for food and subsistence, pastoralist populations are particularly susceptible to climate unpredictability and changes. Ethiopia's pastoralist communities are also now more susceptible to the consequences of persistent droughts (Gashaw *et al.* 2014). However, pastoralists in Ethiopia have gradually created defences and strategies to endure under perilous circumstances (Ahmed and Bihi 2019; Destrijcker *et al.* 2023: 29).

3.5.1 Declining pastures and fodder

Livestock rearing in Ethiopia is completely dependent on nature, being totally rainfed, and is the major form of livelihood supporting the economy of the pastoral communities. Therefore, climate change affects livestock productivity by modifying ecosystem amenities such as water availability, fodder quantity and quality (Habte 2022:2). The semi-arid and arid lowlands of Ethiopia are particularly vulnerable to climate change and are inhabited by people who have few assets of limited diversity and greatly depend on rainfed agriculture, together with their livestock. Consequently, the livestock sector is a victim of climate change. Gashaw *et al.* (2014) further reported that climate change has led to a substantial invasion of pastures by invasive plant species, which in turn has resulted in reduced availability of herbaceous species and consequently a critical scarcity of palatable fodder. Similarly, Stark *et al.* (2011) states that in a number of regions, invasive plant species such as the *Prosopis juliflora* are severely reducing or totally taking-over nutritious grazing lands and pastoralists are linking these invasive species to both restrictions on bush burning and climate change. Climate change has had a significant impact on the range lands in Moyale and Dillo in

Ethiopia and many areas the range land has been transformed into a simple termite mound as illustrated in Figure 3 (Gashaw *et al.* 2014).

Figure 3: Rangelands in Ethiopia



(Abdu and Robinson 2017)

Evidence indicates that the growing seasons in numerous grazing lands, particularly in the region of sub-Saharan Africa, might become shorter (Rowlinson 2008). The geographical distribution and availability of both pasture and water are greatly reliant on the pattern and availability of rain water (Tofu *et al.* 2023).

In Ethiopia, the main sources of livestock fodder are open grazing on pasture lands, grazing on crop remains, left in the fields after the harvests, and grazing on weeds from arable lands (Birhan and Adugna 2014). Open grazing on pasture lands contributes the largest share of livestock fodder (Tegegne *et al.* 2011). Since the open pasture is frequently thoroughly grazed and hence the stored crop biomass is used up before the next rainfall season begins, shortages of livestock feed commonly occur during the dry season, creating a significant challenge in terms of fodder quality and quantities (Worqlul 2021). Climate change can cause increased fluctuations in crop

yields as a result of factors like heat stress, water shortage, and pest invasions as previously mentioned in chapter 2. These fluctuations can directly affect the quantities of crop leftover after harvests and available for livestock to feed on. Tadesse and Dereje (2018) report that variations in rainfall patterns and temperature ranges have an impact on availability of fodder, grazing pastures, quality of fodder, proliferation of weeds, proliferation of pests and prevalence of disease.

Ethiopia's livestock feed and fodder are significantly impacted by climate change, especially in the lowlands that are arid and semi-arid, where communities primarily depend on rainfed crops and livestock. This dependence renders the livestock industry particularly vulnerable to the effects of climate change. One of the primary consequences of climate change is the spreading of invasive plant species into pastures, which causes a severe scarcity of suitable feed and fodder. Moreover, the availability of crop residuals utilised as feed for livestock is directly impacted by climate-induced variability in crop yields caused by factors including excessive heat, scarcity of water, and infestations of pests. Furthermore, fluctuations in temperature and rainfall patterns have a significant impact on a range of livestock breeding aspects such as grazing pasture availability, feed quality, weed growth and outbreaks of pest diseases.

3.5.2 Livestock productivity

Climate change creates favourable environmental conditions for pathogens and disease-causing insects to survive, complete their life cycles and transfer diseases to the livestock. These conditions directly result in increased susceptibility of different livestock species to disease vectors and pathogens (Desalegn 2016; Morand 2015). As reported by Gashaw *et al.* (2014), the four principal impacts of climate change on livestock production among the Borana pastoralists comprise shortage of feed, shortage of water, diminished productivity, and reduced mature body weight and/or extended time to reach mature body weight as highlighted in chapter 2.

Elevated temperatures have a tendency to decrease the intake of livestock feed and also decrease the rate of feed conversion in the animal (Rowlinson 2008). The impacts of climate change on livestock production include alterations in availability of livestock feed and reductions in rainfall or water accessibility both of which affect livestock in

terms of health, growth and reproduction thereby diminishing the size of cattle herds, altering the type of fodder, quantity and quality, encouraging the transmission of diseases, decreasing livestock performance and maturity, altering the income and livestock prices in many parts of Ethiopia (Belay *et al.* 2017; Habte *et al.* 2022). For example, regions of pastoralists are very susceptible to hostile effects of climate change and variations in climate in East Guji and Borana Zone, south-eastern of Ethiopia (Yilma 2009). Likewise, it is reported that pasture and water availability in Fentale District of Oromia in Ethiopia is scarce, and livestock herds and productivity are greatly reduced, because of the hostile effects of climate variability and climate change (Mekuyie and Mulu 2021). Demen (2023:4-5) reports that between 483,400 and 572,350 Ethiopian Birr (ETB) of precious livestock fodder were destroyed by climate variability and climate change in 2017. Consequently, between 939,280 and 1,003,800 ETB that could have been earned from livestock production, were lost due to climate variability and climate change in Ethiopia's Kolla and Woyina Dega agro-ecological zones in Konso District, and in SNNP region respectively (Demen 2023:4-5).

Increased temperatures result in heat shocks that affect the livestock negatively resulting in disease outbreaks among the livestock. Gashaw *et al.* (2014), Hidosa and Guyo (2017), Kefyalew and Tegegn (2012), disease outbreak, and livestock under stress from heat shock are just a few examples of how ecosystem services such as water availability, forage quality and quantity, disease outbreak, and animals under stress from heat shock are all being affected by climate change, which also affects livestock productivity (Bagath *et al.* 2019; Morand 2015). Currently, there is an increase in the prevalence and distribution of cattle diseases, which is thought to be related to climate change. According to Yattoo *et al.* (2012) and Lubroth (2012), wind and its direction have a positive correlation with the dispersion of diseases and vectors. According to several studies (Desalegn 2016; Lubroth 2012; Morand 2015; Yilma *et al.* 2009), climate change increases the predisposition of livestock species and distributions to transmitters and infections by decreasing available feed supplies and generating environments that are conducive to disease survival, cycle completion, and transmission. According to Habte *et al.* (2022:2-3), the livestock industry and rangeland resources will be directly impacted by the consequences of climate change, which will also have an influence on the livelihoods and food security of pastoralists.

Climate-driven effects like repeated droughts have been seen to cause livestock losses (deaths), which has a detrimental effect on the livelihood security of pastoralists.

Climate extremes significantly affect the productivity of livestock in Eastern Africa. The existence of arid and semi-arid isolated regions as well as the livelihoods of drought-prone communities are all threatened by the increasing frequency and severity of droughts, changes in water availability, and patterns of temperature and rainfall variability (Ulrichs *et al.* 2019). Ethiopia is the main producer and exporter of livestock on the continent, and it also has the biggest population of livestock (Bogale and Erena 2022:472). The 12% of the people in Ethiopia who live in pastoral and agropastoral communities raise livestock in semi-arid and dry regions that are prone to drought. Thus, the recurring climatic change in these areas is related to the decline in livestock population and productivity (Berhe *et al.* 2017). Consequently, changes in climatic factors such as temperature, rainfall and the incidence and severity of extreme events such as droughts directly affect livestock productivity.

The impacts of climate change manifest themselves through reduced precipitation and water availability, alterations in feed availability and quality, and their implications on the growth, wellness, and reproduction of livestock. As a result, there is a decrease in livestock, a change in the type and quality of fodder, an increase in disease transmission, and a decline in livestock maturity and performance, all of which have an impact on livestock prices and revenue across different regions of Ethiopia. Livestock productivity is also impacted by climate change due to its negative effects on the ecosystem; effects such as the availability of water and the quality of the forage. The livelihoods and food security of pastoralists are greatly impacted by these changes, which also have a direct impact on the livestock sector and rangeland resources. This is especially true in light of the frequent droughts brought on by climate change.

3.6 Climate change and food insecurity

Ethiopia is known as a country where food insecurity and famine are prevalent and pervasive. It is reported that over 25 million people were affected by famine during the period between 1958 and 1977 and from 1974 to 1991, when the country was wrecked

by political instability, war, famine, and economic decline (Beyene 2008). The pervasiveness of food insecurity and the associated vulnerability is largely high in rural communities of Ethiopia, where 84 percent of the population live (CSA 2007). This situation is largely attributed to rainfed subsistence farming, which is the primary form of agricultural production and the backbone of rural communities (Demeke *et al.* 2011; Collier *et al.* 2008; Di Falco *et al.* 2011). Poverty and vulnerability to food insecurity in Ethiopia remain very high (Dercon and Christiaensen 2011; Dercon *et al.* 2012; Kumar and Quisumbing 2012). Droughts are a major driver of food insecurity in Ethiopia.

Protracted droughts along with poor government response to deal with effects of climate change result in the constant crisis of food insecurity. Food insecurity is a major concern in Ethiopia, and it has been gradually increasing (Sisha 2020; Messay 2020). A range of factors, such as extreme weather patterns, environmental degradation, high population density, inadequate government commitment, and policy weaknesses lead to food insecurity (Messay 2020). Ethiopia has been suffering from a protracted drought since the end of 2020 as a consequence of three successive failed rainy seasons. 8.2 million people have been impacted by this, including those in the Somali (3.5 million), Oromia (3.4 million), Southwest (200,000), and Southern Nations, Nationalities, and Peoples (SNNP) (1.1 million) parts of southern and south-eastern Ethiopia. The catastrophic drought that hit the same regions in 2017 left residents with little opportunity to recover, and the subsequent failed rainy seasons in 2021 have only made the situation worse (Smith and Frankenberger 2022). Consequently, pastoralist communities tend to bear the brunt of the effects of the droughts and food insecurity.

Pastoralism in Ethiopia is inhibited by droughts, erratic rainfall patterns, inferior livestock productivity, degradation of grasslands, diminishing fodder species, reduction in fodder availability and increasing incidences of livestock disease as well as livestock mortality. Consequently, the majority of people in the study area frequently face food insecurity (Abebe *et al.* 2012; Mirkena *et al.* 2018).

According to the 2021 Global Hunger Index (GHI, 2021). Ethiopia is ranked at 90 out of 116 countries in terms of hunger. A combination of forces, which includes a largely market-based food supply, prolonged poverty, and increasing food prices, are challenging household food security in cities like Addis Ababa (Serbessa *et al.*

2023:94). Birhane *et al.* (2014), state that 79.9% of the population in Addis Ababa is food insecure. Some of the reasons for high food prices comprise an imbalance in food supply and demand as a result of urban population growth (Miccoli *et al.* 2016) and increased land use as well as land cover change, which converts farmlands into built-up areas (Alemu 2015; Abo-El-Wafa *et al.* 2017). It is reported that about 26 million people are food insecure in Ethiopia. The Amhara region is reported to have recorded the highest percentage of food insecure households in Ethiopia (36.1%), followed by Afar (26.1%) and Tigray (24.7%). Approximately 22.7% of rural inhabitants and 13.9% of urban residents are food insecure (Tigistu and Hegena 2022). In Ethiopia, conflict and climatic shocks add to increased disaster needs as well as to internal population displacement. Due to violent conflict, unpredictable rainfall patterns, pest infestations, and disease outbreaks, more than 8 million people nationwide, are in need of humanitarian support per year (USAID 2020).

Somalia, Ethiopia and Kenya have experienced the worst outbreak of desert locusts, this has had a detrimental effect on the crops and pastures in these countries (Salih *et al.* 2020). The areas that were most severely impacted in Ethiopia were Oromia, Somali region, and Tigray, which are already known for their persistent food insecurity (Zhang *et al.* 2022). According to Yigzaw and Abitew (2019), another important contributor to food insecurity is displacement. Over 2 million people have been displaced in recent years as a result of violence, natural disasters brought on by climate change, and deliberate resettlement plans. Unfortunately, communities that are uprooted frequently lose their productive resources, including their households, livestock, and crops, which affects their ability to get food and clean water. Furthermore, host communities have greater demands related to food security when internally displaced persons are relocated to those communities.

Armed conflict has a significant impact on Ethiopia's ability to get food in a similar way that displacement has on food security. The Oromo and Tigray conflict, which is fuelled by intricate nuances of ethnic, land, and political divergences, is comparable to other conflicts, such as the Ethiopian civil war of 1974 (Human Rights Watch 2020). Conflicts negatively impact access to markets, trade, and the cultivation of crops, it also stops herders from getting access to their pasturelands, thus resulting in hikes to food prices (The Food Security Information Network 2021). Additionally, crops are used as

weapons of war since the deliberate destruction of agriculture and the ability to produce food results in the purposeful infliction of starvation (Gavin 2021). There is a high prevalence of food insecurity in Ethiopia's northern, eastern, and southern regions. Climate change and conflict are the two main cause that result in food insecurity these regions. In the south and south-east, about 8 million people are impacted by an ongoing drought. 83% of people live in food insecurity in the region of the north that has experienced conflict. Food insecurity, poverty, and inequality have increased as a result (Delgado *et al.* 2023). If food insecurity if not addressed in a timely manner it always results in famine. Food insecurity in the developing countries is always attributed to crop failure and loss of livestock due to prolonged droughts and other climatic variabilities (Verschuur *et al.* 2021; Affoh *et al.* 2022; Ngcamu and Chari 2020).

The crucial problem of food insecurity in rural Ethiopian communities where a significant 84 percent of the nation country's population lives is addressed in this section. The main cause of this prevalent problem is rainfed subsistence farming, which is the cornerstone of many communities. Food insecurity is a result of a number of factors such as adverse weather patterns, degradation of the environment, dense population, insufficient government support, and weak government policies. It is stated that 8.2 million people are impacted by the prolonged drought that has been continuing on since late 2020 and has resulted in multiple unsuccessful rainy seasons. This drought has primarily affected parts of the country like Somali, Oromia, Southwest, and Southern Nations, Nationalities, and Peoples (SNNP) in southern and southeast Ethiopia. Displacement is a major cause of food insecurity with over 2 million people being uprooted due to conflict, natural disasters caused by climate change, and resettlement initiatives by government. Communities that have been displaced lose their resources, which affects their ability to obtain clean water and food. Food insecurity is made worse by armed conflict as it interferes with trade, markets, the cultivation of crops, and limits the access of herders to pastures. Furthermore, food insecurity also results from the deliberate destruction of crops as a weapon of war.

3.7 Conclusion

The historical overview provided in this chapter shed light on the intricate interactions between droughts, famines, government, and social reactions in Ethiopia in the 1970s and 1980s. This chapter highlights the significant influence that climate-related issues have on governance, highlighting the shortcomings of the Haile Selassie administration in terms of efficiently handling crisis brought on by recurrent droughts. It was established that in Ethiopia, the relationship between agriculture, food security, and climate change is a recurring issue that highlights the vital connection between livelihoods and the use of natural resources, especially land and water. Ethiopia's terrain, geographical location, and low capacity for adaptation make it incredibly susceptible to climate change. The country's agricultural sector is impacted by altered rainfall patterns that are worsened by climate change. Droughts happen roughly every two to three years, and other extreme weather occurrences, such as heatwaves and floods which exacerbate food shortages and economic difficulties. This vulnerability is closely related to population expansion, overuse of land, land shortage, and climate change. In this chapter it was discovered that the livestock industry, which is mostly dependent on rainfed crops, is confronted with a number of difficulties, such as the invasive plant species' proliferation, reduced feed quality, and a negative impact on the productivity of the livestock. The significance of tackling climate change in the Ethiopian setting is highlighted by this, as well as the extensive effects on food security and pastoralist lifestyles. Furthermore, the issue of food insecurity that continues to plague rural Ethiopian people was explored, with rainfed subsistence farming serving as the main contributing factor. A severe food security problem that has affected 8.2 million people during a protracted drought since late 2020 is the result of a confluence of unfavourable weather patterns, environmental degradation, population density, little government help, and ineffective policy.

CHAPTER 4: THE IMPACT OF CLIMATE CHANGE AND FOOD INSECURITY ON PASTORALISTS

4.1 Introduction

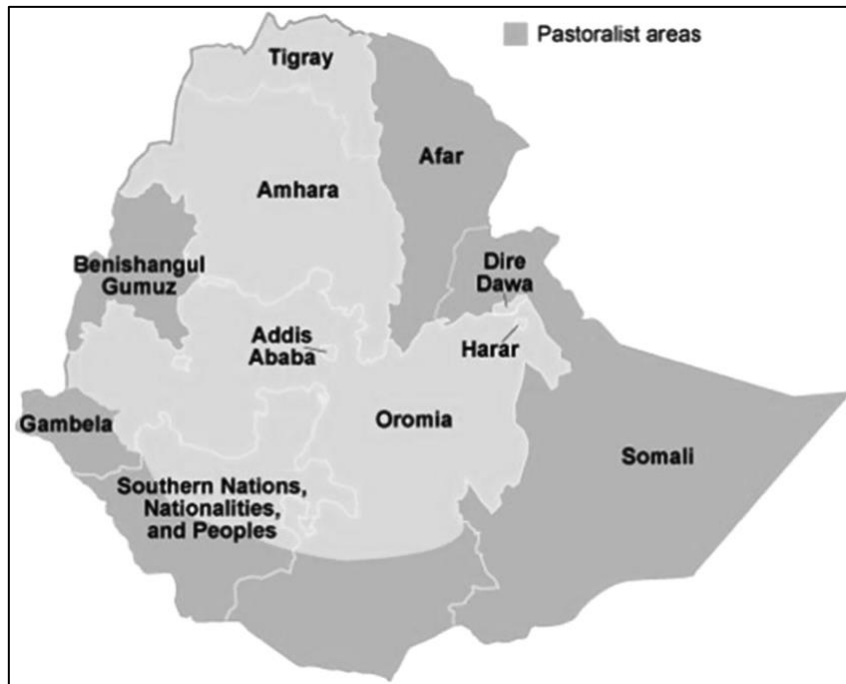
Pastoralists in Ethiopia are extremely vulnerable to the effects of climate change and food insecurity due to their dependence on rainfed agriculture. The main pastoralist group that this chapter will focus on are pastoralist communities in the Somali region. The region is home to a sizeable pastoralist community that depends mostly on livestock for their livelihoods, which will be discussed in this chapter. Furthermore, the Somali region has seen protracted droughts and variations in the climate, which have left pastoralist communities facing significant food insecurity as pointed out in Chapter 1. The aim of this chapter is to examine if climate change and conflict can account for an exacerbation of conflict in the Somali region between 2015 and 2022. This chapter will start with an overview of pastoralist in Ethiopia, it will then be followed by a section on the impact of climate change on pastoralist in Ethiopia. The next section will delve into the impact of food insecurity on the Somali region pastoralists. Subsequently, a historical context of conflicts will be provided to set the stage, leading into a section that chronologically provides an overview of conflicts from 2015 to 2022. Then lastly a section that addresses how climate change and food insecurity can exacerbate conflict among pastoralists in the Somali region.

4.2 Overview of pastoralists in Ethiopia

In Ethiopia, pastoralists occupy 61% of the total land area (Mohamed 2019) and are scattered over 122 districts of the country. The majority of these districts are in the very isolated and marginalised parts of the country, where people's livelihoods are dependent on both accurate knowledge of the local ecosystem and on the health of their livestock (Gebbisa and Mulatu 2020:2). In agreement with Gebbisa and Mulatu (2020:2), Tofu *et al.* (2023) state that, pastoralists are found predominantly in the generally arid or semi-arid and sparsely populated lowlands of Ethiopia. Tofu *et al.* (2023) further state that these lowlands account for 61% of Ethiopia's total land mass, with 97% of the pastoralists occupying predominantly the northeast, east, and south of the country as illustrated in Figure 4. Pastoralists are primarily found in the four

lowland regions of Afar, Somali, Oromia, and in the Southern Nations, Nationalities and People's (SNNP) regional states. Apart from these four regions, pastoralists are also found in areas of Gambella and Benishangul (Burka *et al.* 2023). The highest number of pastoralists (53%) are in Somali, followed by Afar (29%) and Borana (9%), while the rest (8%) are in the Gambella, Benishangul, and Tigray regions.

Figure 4. Pastoral areas of Ethiopia



(Tsegay and Kenton 2022)

Ayele *et al.* (2020:9), state that pastoralist communities earn their livelihoods through rearing of livestock. It is reported that for approximately 10 million pastoralists in Ethiopia, the main source of wealth and subsistence is animal husbandry. Hence livestock production is the major source of revenue for the pastoralists in Ethiopia. All the available camels, three quarters of the goats, one quarter of the sheep, and one fifth of the cattle in Ethiopia are all owned by the pastoralists (Gebeye, 2016). A greater part of the livestock used for domestic meat and export originates from pastoral regions; the livestock sector being second to coffee in bringing in foreign currency to Ethiopia (Gebeye, 2016). The livestock sector of Ethiopia contributes 12%-16% of the national GDP and 30% - 35% of the agricultural GDP. The livestock GDP inside both the pastoralist areas and drought-prone highland areas (approximately like the arid and semi-arid zones) of Ethiopia, is nearly 15 percent of the national agricultural GDP.

Approximately 50 percent of the added value of livestock comes from these zones; and generally, livestock accounts for almost 30% of the national agricultural GDP (Gebisa and Mulatu 2020:2).

However, with the passage of time, there has been a gradual decrease in the practice of pastoralist livelihoods; as evidenced by decrease in numbers of animals and variety of livestock reared, as well as decreased livestock production and productivity. Environmental and anthropogenic drivers have contributed to the degradation of the rangelands and water resources on which the lifestyles of pastoralists in arid and semi-arid regions of Ethiopia depend, and this has progressively negatively impacted their livelihoods. The environmental drivers consist of greater than before rainfall variability, including an increased frequency and severity of droughts and floods (Adnew Degefu *et al.* 2020:899). According to Mohamed (2019:5), communities of pastoralists faced with life-threatening and worsening levels of food insecurity, greatly affected by violent conflict, and marginalised politically and economically, have diminishing access to natural resources on which their livelihoods are dependent, and very little access to basic infrastructure and socio-economic services. Inappropriate development policies which result in ineffective institutional settings, unfair resource distribution and increased pressure on pastoral ecosystems are responsible for the underdevelopment and poverty among pastoralists.

The pastoralist regions of Ethiopia are characterised by recurrent droughts, leading to famine, and resulting in high livestock mortality which is threatening pastoral sustainability as mentioned in Chapter 1. Furthermore, the size of rangelands that pastoralists and agropastoralists rely on is decreasing due to a variety of factors such as population growth, agricultural invasion, land degradation, blocked migration routes, and ethnic conflicts triggered by the shortage of natural resources (Rufno *et al.* 2013; Lind *et al.* 2016).

A large portion of Ethiopia's land mass (61%) is inhabited by pastoralists, mostly in the arid or semi-arid lowlands. The rearing of livestock is a vital part of the livelihoods of some 10 million pastoralists, who are dependent on it as their primary source of income and subsistence. Pastoralists livelihoods have been gradually declining, as seen by declining productivity and production, decreased livestock in general, and a decrease in variety. This decline can be attributed to natural factors as well as

anthropogenic activities, among them are more irregular precipitation, frequent and extreme droughts and floods, and the deterioration of rangelands and water resources that are essential to pastoralist livelihoods. In pastoralist areas, recurring droughts have resulted in significant livestock deaths, famine, and threats to pastoralists livelihoods. In addition, challenges such as growth in population, agricultural encroachment, degradation of land, hindered migratory routes, and ethnic conflicts related to resource scarcity contribute to the diminishing rangelands.

4.3 The impact of climate change on Ethiopian pastoralists.

The livelihoods of pastoralists depend almost entirely on livestock therefore, livestock production plays a significant role in their financial well-being, economic stability, and sustenance of millions of pastoralists globally (FAO 2021). It therefore follows that, any event which disturbs the ecological balance of the rangeland ecosystem directly affects their livelihoods. It has been predicted that the rising temperatures, resulting from global warming will have devastating effects on in vulnerable areas of in different regions of the world, with a particular mention of the developing world (I.P.O.C 2007). The rising temperatures in these areas will cause extreme weather events that will aggravate the already harsh conditions. It is predicted that, the negative impacts of the extreme weather events on arable land, and on water resources will intensify and lead to declining agricultural and livestock production thus challenge food security, and the livelihood of communities in these areas (I.P.O.C 2007).

Ethiopia is one of the countries in Africa that are most susceptible to climate change due to the country's high reliance on rainfed agriculture as highlighted in Chapter 1. The country has been ravaged by droughts and famines and the attendant serious consequences for the past four decades (Keller 1992). The impacts of climate change are threatening the food security and livelihood of pastoralists. There is a constant decline in livestock numbers, and livestock production, which is attributed to the droughts that are now a common occurrence in Ethiopia's arid and semi-arid regions, where the highest concentration of pastoralists is found (Berhe *et al.* 2017). Notwithstanding these problems, pastoralists have continued to sustain their livelihoods relying on their traditional knowledge and indigenous skills (Charles *et al.* 2014). These droughts, brought about by climate change, reduce the natural

resources which include pastures for grazing and water resources which are essential for the livelihood of the pastoralists.

The persistent climate variability and extreme weather events in Ethiopia are challenging the country's natural resources, specifically its land and water reservoirs. Consequently, there are mounting tensions and disputes among pastoralist communities in competition for these dwindling resources (Bogale and Erena 2022). These disputes, particularly those related to grazing lands and water resources, have exacerbated ethnic conflicts between different communities as they compete for territorial control and influence within the framework of the ethnic federal system (Bogale and Erena 2022). Some of the pastoralist regions in Ethiopia, especially the Somali regional state, which has a largest number of pastoralists, experiences recurrent droughts and persistent food scarcity (Girmay *et al.* 2018). These chronic food shortages have been explained by the over-reliance of their livelihoods on rainfed agriculture, which is very sensitive to the negative effects of climate change as mentioned in Chapter 3 (Fratkin 2014). It is well documented that this over-reliance on rainfed agriculture is detrimental to pastoralists' households.

Pastoralist communities have some peculiar characteristics that differentiate them from other communities. The habitats of the pastoralists are usually harsh on rough terrains which are prone to many risks. A significant portion of the livelihood of the pastoralists originates from livestock and they have common grazing land and water resources (Guyo 2021). The grazing land is affected by climatic factors such as erratic and insufficient rainfall, rising temperatures, and overgrazing which significantly affect the productivity, because the variabilities in precipitation have a direct impact on livestock health and mobility. There has been a constant decrease in the incomes per head of households of pastoralists over the years, therefore the poverty levels among pastoralists have risen and they rank very low in many social welfare indicators (Gebisa 2018; Elhadi *et al.* 2012).

The climatic disturbances affecting Ethiopians in the arid region of the Horn of Africa, are marked by increasing temperatures, limited and unpredictable rainfall, and the consequences like droughts, diseases, pests, as well as shortages of pasture and water. These consequences are expected to become more frequent and intense (Tofu

et al. 2023). This implies that the traditional practice of adaptive migration of pastoralists and their livestock, which has played a crucial role in sustaining pastoral communities and industries for a long time, is now facing substantial challenges (FAO 2021).

In Ethiopia, the effects of climate change are seriously endangering the livelihoods and food security of pastoralists, especially in the semi-arid and dry areas where they are predominantly concentrated. The quantity and productivity of livestock have been steadily declining in these regions due to the frequent droughts and severe weather. Droughts are now prevalent due to changing climatic patterns, which is why there has been a decline in livestock numbers. As a result of the droughts, conflicts and tensions have been exacerbated between pastoralist communities that compete for Ethiopia's diminishing natural resources, especially its land and water sources. Within the context of Ethiopia's ethnic federalism system, competing communities have been striving for control of territories, leading to heightened ethnic conflicts. These disputes are frequently over grazing grounds and water resources. Due to its heavy reliance on rainfed agriculture, the Somali region, which has the highest proportion of pastoralists, is a prime example of a region that frequently experiences droughts and consequently has ongoing food insecurity. This ongoing shortage of food has caused incomes of pastoralists to decline, and the rate as well as magnitude of poverty to increase within these communities.

4.4 The impact of food insecurity on Somali region pastoralists.

The Somali region of Ethiopia has always had few natural resources and recent droughts, flooding and pests have furthermore reduced the resources, bringing about recurrent obliteration of the livelihood of communities and increasing food insecurity. Although livelihoods are somewhat diverse, (agro) pastoralists and farmers continue to rely on natural resources (Beyene 2017). Most of the people in the region depend on livestock as a source of both food and income, however when seasons fail, these families go through a sharp decrease in food security and an increased risk of malnutrition (Awel *et al.* 2016). Furthermore, a warming up of the Arabian Sea leads to increased rainfall amounts in and around the Arabian Peninsula, which in turn creates conducive conditions for increased rates of reproduction of swarms of locusts.

In the years between 2019 and 2021, huge swarms of desert locusts inflicted destruction all over the region of East Africa, severely destroying critical vegetation, agricultural lands, rangelands and fodder crops (Murakami *et al.* 2017). The Somali region is clearly negatively impacted by climate change.

The Somali region is no stranger to the harsh impacts of climate change resulting in increased temperature and droughts. As stated by Hegazi *et al.* (2022:7) the average temperature in the Somali region of Ethiopia is about 26°C and has been rising, relative to the historical average, since the year 2000. It is expected that by the year 2039, the average annual temperature in the Somali region will have increased by about 0.6°C. With reference to the eleven droughts experienced by Ethiopia between 1997 and 2021, a minimum of nine of these droughts affected the Somali region, causing food scarcity. The WFP reported that by October 2020 roughly 8.6 million suffered from food insecurity (World Food Programme 2020). This figure grew since the beginning of the conflict in Tigray in November 2020. The major factors causing food insecurity in Ethiopia are climatic conditions, mainly droughts; a rapidly growing population; land degradation; population migration from rural areas to urban areas; infestations by locust swarms; and conflict (Lewis 2017; Megerssa and Bekere 2019; Kassegn and Endris 2021). As farmers and pastoralists rely on rainfall to grow their crops, and to feed and water their livestock, variations in the intensity, timing and frequency of recurrence of rainfall can be a challenge and can therefore negatively impact food security of families (Demeke *et al.* 2011). Recurrent droughts have therefore intensified food insecurity, particularly in the Tigray, Afar and Somali regions; these being the most arid regions in Ethiopia (Alemu and Mengistu 2019).

In the Somali region, livelihoods are varied; nonetheless up till now they have been greatly dependent on natural resources, which makes the population susceptible to climate change (Devereux 2006). Pastoralism is the main source of livelihood; herders rear livestock and trade livestock products, for instance dairy products (Abay and Jensen 2020). In Ethiopia's pastoral regions droughts occur frequently and expose pastoral livelihoods to difficulties due to death of livestock (Ayele *et al.* 2020). Herdsmen mention that drought and disease are the major factors causing mortality of their livestock (Devereux 2006). Increasing temperatures are expected to have negative physiological impacts on the livestock and might furthermore intensify the

incidence of disease. Changes in climate could also alter the topographical distribution and availability of both water and pastures (Tiruneh and Tegene 2018) thus resulting in more resource scarcity in the region as a result of climate change.

The people of Somali region have in the previous decades experienced wide spread food insecurity and malnutrition mainly due to water scarcity. Although this has been a tendency in various parts of Ethiopia, Somali households have frequently been among the worst impacted by cycles of nutritional disasters. By tradition, the main reasons for food insecurity in the Horn of Africa comprise rapid population growth, conflict and insecurity, as well as natural hazards. Despite the fact that the Somali region is still thinly populated, high population density in areas that are rich in natural resources, especially on farmlands and pastures, is a major determining factor for both food security and livelihood security (Destrijcker *et al.* 2023). Although the latest food security valuations in Ethiopia have been difficult to carry out, mainly because of denied access, a 2019 detailed investigation done by the Integrated Food Security Phase Classification (IPC) established that the whole Somali Region had crisis levels of acute food insecurity. In 2020, about 1.25 million people in the Somali region suffered from severe food insecurity (IPC 2020).

In 2020, roughly 1.25 million people suffered from severe food insecurity in the Somali region due to a number of factors, which included alterations in temperature and rainfall patterns. Extraordinarily dry rainfall seasons decrease the availability of crops and pastures required for the health of livestock; healthy livestock ensures food security for pastoralists (Hegazi *et al.* 2022). In the Somali region, pastoralists and have developed various survival mechanisms for surviving the droughts, for instance altering migration patterns for livestock, livestock raiding, petty trade, selling assets and being involved in labour that pays in wages (Belay *et al.* 2005; Catley and Iyasu 2010). Alteration of migration patterns, links the impacts of climate change with insecurity, and has created inter-communal conflict as pastoralists contend over water resources and pasture lands (Mobjörk 2020).

Losses in livestock and products thereof, including decreases in livestock productivity and crop production during droughts cause household food insecurity, greater incidence of human diseases, and widespread poverty amongst pastoral communities

(Gebremeskel *et al.* 2019:12). Hegazi *et al.* (2022), reports that food insecurity is a major challenge for pastoralists in the Somali region, particularly as their livelihoods are dependent on seasonal rainfall. Insufficient precipitation decreases both pasture availability and water resources, and consequently raises levels of food insecurity since the population depends on their livestock as a source of meat and dairy products for consumption and revenue generation as mentioned in Chapter 3. In these conditions of rainfall scarcity, communities contend for pastures and water resources for their livestock and for the sustenance of their livelihoods and also for food security, thereby increasing social tensions and conflict within communities and amongst communities as mentioned in Chapter 2. Consequently, food insecurity increases competition for pasture and water sources, indirectly resulting in conflicts and social unrest both among and between communities. In the Somali region the impact of climate change is manifesting through droughts that disrupt the seasons, thus leading to a precipitous decrease in food security and a heightened likelihood of starvation as mentioned in Chapter 1. Due to the region's history of droughts, food insecurity is a persistent problem. Food insecurity in the region has reached catastrophic levels, with 1.25 million people facing acute food shortages in 2020, primarily as a result of changing precipitation and temperature patterns. Inadequate precipitation limits the accessibility to pasture and water resources, thus affecting the food security of pastoralists who depend on livestock. This paragraph therefore demonstrates how food insecurity can intensify possible conflicts among pastoralist communities in Somali region due to climate-induced events and reliance on resources.

4.5. Historical context of the conflicts

The conflicts between the Somali and Oromo pastoral groups and also between the Somali and Afar pastoralists were largely a result of discontents of the pastoral groups in these regions concerning the usages and sharing of pastures and water resources in these areas that suffer a lot from severe by droughts, famine, poverty and from interference by external role players that have geopolitical interests on this strategic area. Somali pastoralists and Oromo-Afar pastoralists were mostly involved in traditional cattle raiding and on competitions for pastures and water resources but these rivalries evolved into border conflicts after the 1991 state restructuring (Mohamed 2018:42). According to Bayu (2021:8), it is historically reported that the

Somali and Oromo communities have lived peacefully together for centuries, having much more in common than what divides them. They are similar in their Cushitic-Muslim identity, economic interdependency, inter marriages, shared customary institutions that addressed usage and management of resources, as well as conflict resolution. This is mainly people living in the border areas of these two regions have had dual identities; as being Somali-Oromo (Bayu 2021:8). Gelan *et al.* (2017) furthermore states that the conflict is entrenched, with a history dating all the way back to the reign of Ziad Bare of Somalia and the reign of Emperor Haile Selassie of Ethiopia. During the reign of Ziad Bare of Somalia and that of Emperor Haile Selassie of Ethiopia, the conflict in the southern and south-eastern Ethiopia was between Somalia and Ethiopia but not between the different pastoralist ethnic groups. In this conflict, Ziad Bare of Somalia's political mission was to increase the territorial gains of for the nation of Somalia by means of uniting all Somali ethnic groups and creating "Great Somalia". This political mission of Ziad Bare has continued to be the basis of the current conflict between the Oromo and Somali ethnic groups in among pastoralist groups in southern and south-eastern Ethiopia.

The current competition for land was triggered by Ethiopia's political transition towards federal restructuring which was aimed at connecting ethnicity, territory, and administrative boundaries. The effort to have territories adopt ethnic identity has been defied, as it caused inter-ethnic tensions with respect to assigning control of territories (Kefale 2013). Previously, violent conflicts frequently occurred as a result of competition for access to pastures and water sources for the livestock. This happened because, the pastoralists would try to stop invaders from forcing their way into their pastures during periods of severe shortage, without firstly negotiating with the pastoral group that had the major rights to a specific grazing area of land (Kenee 2022:415).

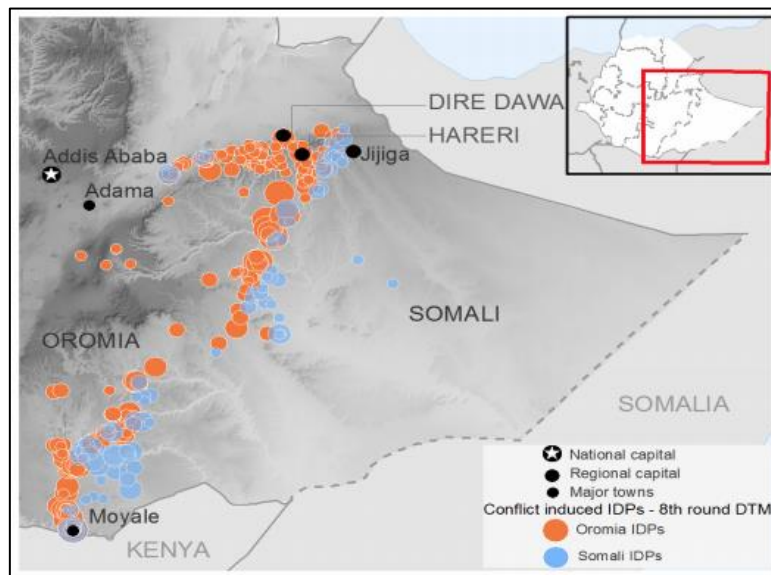
The conflicts between Somali and Oromo pastoralist communities, and the Somali and Afar pastoralists, are driven by conflict over pasture and water sources. This also highlights that even historically conflicts between pastoralist communities have been resource based conflicts Even though these communities have always coexisted peacefully, they have witnessed a shift in their interactions from the normal resource competition and livestock raiding to more pronounced territorial borders conflicts. These pastoralist communities share similar characteristics, they both are Cushitic-

Muslim, they depend on each other economically, and they have traditional structures and institutions for managing resources and resolving disputes. This complicated history of conflict extends back to the reign of rulers like Emperor Haile Selassie of Ethiopia and Ziad Bare of Somalia with the acquisition of land and politics as the foundation of most conflicts. Ethiopia's federal restructuring initiatives, aimed at reconciling ethnic identity with territory and administrative borders, can be linked to the continuous fight for land in the region.

4.6 Overview of conflicts between 2015 to 2022

Since December 2016, there has been an increase in the number and intensity of resource-based conflict between Somali and Oromo pastoral tribes at the border between the Oromia and Somali Regional States (Kenee 2022:406). The Somali region has furthermore been impacted by small-scale, localised communal and ethnic conflicts, specifically compelled by food insecurity or livelihood insecurity, and lack of access to land and natural resources. In addition, pastoral areas in the Somali region in particular, and in the Horn of Africa in general, have been traditionally predisposed to conflicts at community level. Cattle-raiding, land disputes between farmers and pastoralists, and conflicts between clans over territory and natural resources have for a long time been an inherent part of pastoral life (Mkutu 2001). Inter-ethnic conflicts frequently happened in border areas between Afar and Oromia regions and from 2016 to 2018, a fresh outbreak of clashes between the peoples of Somali and Oromia regions displaced millions as illustrated in Figure 5 (Majid *et al.* 2022).

Figure 5. Somali-Oromo conflict



[\(https://tesfanews.net/ethiopia-million-displaced-romia-somali-conflict-un/\)](https://tesfanews.net/ethiopia-million-displaced-romia-somali-conflict-un/)

An example of the intensified inter-ethnic clashes is the fighting between ethnic Oromo and Somali communities along the borders of the East and West Hararghe zones in the Oromia region and Fafan district in the Somali region. These ethnic conflicts climaxed on August 4, 2018, in violent attacks on ethnic minorities in Jijjiga city, following months of hostilities along the Somali/Oromia border area, primarily driven by rivalry over the critical resources (Ethiopian Peace Observatory 2023). In 2021, the long-standing inter-ethnic conflict between Afar and Somali (Issa clan) communities over several disputed kebeles in border areas became more intense, with the participation of regional armed forces from both sides. In 2021, the ongoing conflict had displaced 39,000 people in Afar and more than 67,000 people in the Somali Region (OCHA 2021).

Due to armed clashes that happened in August 2022 between Afar and Somali ethnic militias in Cundhufo kebele in Gewane woreda and Danlahelay in Siti zone in the Somali region, thousands of civilians were displaced (ACAPS 2023). The three kebeles of Adaytu, Garba-Issa, and Cundhufo were integrated to the Afar regional state through an agreement signed by the regional states Somali and Afar. The agreement granted Somalis residing in the disputed territory greater political autonomy as “special kebeles” within Afar regional state. At the same time, these territories are presently in disagreement with the Somali government. This has brought about fighting

between the regional forces in Afar and Somali, currently severely affected by the current drought (Addis Standard 2022).

The Somali Region has seen a high frequency of communal and ethnic conflicts, which are typically caused by challenges linked to limited access to resources such as land and water, as well as food insecurity and failure to ensure livelihoods. It been pointed out that since December 2016 there has been a significant escalation of resource-based conflicts between the pastoralist communities of Somali and Oromo along the border between Oromia and Somali Regional States. These conflicts have led to an increase in ethnic tensions. During the same period, similar conflicts also happened along the border regions of Afar. Numerous people were displaced as a result of these conflicts. In addition to that, the long-running conflict over contested kebeles along the border has escalated between Afar and Somali communities. In 2021 the regional armed units from both communities got involved the conflicts. Conflicts have arisen as a result of the kebeles Adaytu, Garba-Issa, and Cundhufo's recent incorporation into the Afar regional state, which granted them political autonomy as "special kebeles." The persistent drought have clearly played a role in exacerbating the already on going resource based conflicts that have historically been present and continue on as stated in the previous section.

4.7 The link between climate change, food insecurity and conflict among pastoralists in the Somali region

Ethiopia has recently reported high incidences of ethnic violence between communities in different regions, in which resource scarcity has been one of the major reasons. These conflicts have been reported in the Somali, Oromia, SNNPR (Southern Nations, Nationalities and Peoples'), Gambella, Afar and Benishangul-Gumuz regions (Devonald *et al.* 2022). The southern and eastern border regions of Ethiopia in particular are experiencing recurrent rivalry between trans-border pastoralist groups over limited resources and are at present a flashpoint for such conflicts (Flintan and Tamrat 2002). Tadesse (2015:34), mentions that these conflicts mostly occur between the Oromo, Afar and Somali ethnic groups, in places where the three rival groups share porous and disputed borders thus acting as a cause of ethno-political and ethno-territorial rivalry, which is a characteristic of the majority of inter-regional pastoralist conflicts in Ethiopia. The regional boundaries among these three regional states,

which were introduced by federalism in Ethiopia in 1991 (Kassie, Cheru, Sishaw, & Bogale, 2023), that established federal regions based on ethnic lines and was intended to empower ethnic groups. However, the unintended consequence is the also intensification of boundary disputes as communities sought to maximize their territories and control over resources (Tsegaye *et al.* 2015).

These regional boundaries have their roots in the colonial and post-colonial era administrative decisions, which discounted the socio-cultural and economic realities of the ethnic communities. The boundaries were arbitrary established ignoring the historical traditional land use patterns of pastoralist communities (Admassie & Abebe, 2018) which are the major inhabitants (Dereje, 2018). Due to the ill-defined and controversial nature, the boundaries are hardly recognised and enforced.

Conflicts between groups of pastoralists fighting for control of pastures and water resources increase mainly during droughts and as a result of inadequate rainfall (Devonald *et al.* 2022; Flintan and Tamrat 2002). The impacts of climate change impacts, including erratic rainfall patterns and prolonged droughts, have exacerbated food insecurity in this region, leading to heightened conflicts among pastoralist groups (Admassie & Abebe, 2018). These conflicts could be classified as climate change-related, i.e., resource access and availability route (Gebre, 2021; Admassie & Abebe, 2018) and food insecurity related, i.e., livelihood and food insecurity route (Sax, Hassan, Abdi, Garcia, *et al.* 2023; Kassahun 2020).

4.7.1 Climate change-related conflicts among pastoralists in the Somali region

The Somali region, situated in the south east of Ethiopia, is home to the highest pastoralist population in Ethiopia (USAID (United States Agency for International Development), 2016). The climate of this region is arid and semi-arid with low precipitation, high temperatures and there is inadequate infrastructure (Tulu *et al.* 2023). Madurga-Lopez *et al.* (2022), state that the Somali region is one of the regions that is most impacted by the ongoing drought, which has led to the death of more than one million livestock. Climate-related events, such as drought-induced displacements have become so recurrent that new displacements take place before the old displaced people are resettled (Tufa, 2024). Thus, climate-induced displacements in the region are no longer

temporary and periodic problems that can be treated less seriously than other displacements. These recurrent droughts have caused a significant decline in water levels in ponds, dams and boreholes of the Somali region and thus promoting conflicts as the pastoralists are forced into overcrowded areas where they share very limited resources (Alemu and Mengistu 2019; Van Weezel 2019).

Due to competition over scarce natural resources such as water and land for pasture, the Somali region has experienced an escalation of conflicts, mostly between the Oromo, Afar, and Somali ethnic groups. These three ethnic groups share porous and disputed territorial boundaries. These conflicts are more prevalent during prolonged droughts and periods of insufficient rainfall because pastures and water resources become scarcer during these periods. The situation has been exacerbated by the prolonged drought, which has killed over a million livestock. The region's resource scarcity is made worse by the influx of refugees and expanding population. Moreover pastoralism has traditionally been the primary source of income in these semi-arid and arid regions. Markakis (2015) and van Weezel (2019), reported that when rainfall amounts are low during the long rainy season, communal conflicts and clashes between and among farmers and pastoralists, such as those between the Issa, Somali and the Afar have a tendency to be more frequent and of greater intensity. This is highlighted by the more intense inter-ethnic conflict between Afar and Somali (Issa clan) communities over several disputed kebeles in border areas (OCHA 2021).

Water and grazing are the primary needs for the livestock and, therefore, pastoralists get into conflicts in search for water resources and grazing pastures for their livestock. Mohamed (2018) also adds that, the hostilities associated with scarcity of resources in the region is aggravated by the growing population and numbers of livestock, which have not been matched by an equal expansion of social services. This is further intensified by an influx of refugees from drought devastated areas. In areas where regional boundaries are being contested, the conflicts rooted in traditional cattle raiding and resource competition have transformed into frontier conflicts (Markakis 2015; Mohamed, 2018). Therefore, these ethnic conflicts aggravated by droughts are a survival strategy as pastoralists endeavour to sustain their livelihoods and households in the harsh environment.

The recurrent droughts force pastoralists to move their livestock further and sometimes crossing into neighbouring communities in pursuit of water sources and grazing pasture land, which causes inter-communal conflict over the limited natural resources. The ensuing conflicts in turn worsen food insecurity, feeding the vicious cycle of climate change, conflict, and food poverty. Territorial disputes and cattle rustling are frequent among several ethnic groupings. Violence between pastoralists and between pastoralists and agro-pastoralists has mainly occurred over resources and the ongoing tradition of cattle rustling or robbing (Lumborg *et al.* 2021). Therefore, they seize these animals and add to their own herds of animals as a means of livestock production as well as to sell in other areas of their regions and across the border.

The Somali region due to its arid climate, can only support pastoralism. Lind *et al.* (2016) state that 60 percent of the Somali region's population was still engaged in pastoralism as the main source of income. Thus, in the Somali region, changing the nature of land ownership and acquisition for pastoralists is associated with changing the nature of land use, since the state is nowadays interested in the Somali region following resettlement (Mohamed 2018). According to Mahli (2019), state land is a recent occurrence is defined as including labour, surface, building roads, factories, and other infrastructural development requirements. Ever since the control of land and water resources in the Somali region came under the private control of other Somalis, the accessibility of land to pastoralists in the region started decreasing causing them to move with their livestock as Somali pastoralists have been typically known for their migration to find pasture and water for their livestock. These migrations have been one of the main causes of disputes and conflict between pastoralists and their neighbours. As a consequence, conflicts among pastoralists will always happen as long as the climate is arid and their livestock needs grazing lands and water sources. It's worth noting that these conflicts are historical and also on ethnic lines as the pastoralists try to make a living from their trade. They have just been exacerbated by the impact climate change.

Since these territorial conflicts are historical, there is a reason why they have continued over the years among the pastoralists. Hagman *et al.* (2008), state that historic claims of pastures and water started again after the administrative decentralisation, which happened in the early 1990s, when pastoralists tried to expand

their district boundaries and to demand sole ownership of the disputed resources. Previous inter-ethnic resource conflicts mainly involved individual clan lineages, but not entire ethnic groups (Hagman *et al.* 2008). Therefore, different elements of conflict have been added to the competition over scarce natural resources, to include sources of revenue and the control of markets (Markakis 2015). The Somali-Oromo violent clashes in 2017 over disputed grazing lands and water resources, which led to significant casualties and displacements (Gebre 2021) are a notable example of how climate change-induced insecurities exacerbate inter-community tensions.

The southern areas of Ethiopia, which are already characterised by a harsh dry climate, are some of the hardest hit areas by climate change. Gelan *et al.* (2017) studied the area that is located at the southern edge of Ethiopia, bordering Kenya and Somalia. Administratively, this area belongs to Borana zones of the Oromia regional state and Liben zone of the Somali regional state. In these arid and semi-arid regions, pastoralism has guaranteed sustainable livelihoods for millennia by maintaining a communal land-holding system that permits pastoralists to share resources and mitigate risks related to climate change and conflicts. Nonetheless, these regions are exposed to climate shocks with recurring austere droughts exacerbating conflict among the pastoralists. Current evidence shows that shorter periods between droughts, progressively frequent dry seasons, and large-scale conflicts cause significant loss of lives and assets (Majid *et al.* 2022; Tan and Hassen 2023). In addition, increased competition for water and grazing pastureland during the dry season has caused violent conflicts (Burka *et al.* 2023). The average annual rainfall across these regions fluctuates between 500 and 700 mm, with an overall mean of 648 mm while surface evaporation is high from September-October (Gelan *et al.* 2017). The ecological conditions of this area favour pastoralism more than crop farming. Farming activities that are carried out on the previously pastoral lands through infringement are the potential source of conflict (Gelan *et al.* 2017). Therefore, even though the areas are conducive to pastoralism, the resource scarcities bring the pastoralists into conflict among themselves.

The conflicts among pastoralists which become ethnic conflicts force people to migrate other areas with their livestock to safer areas and also to search for better pastures for their animals within the country. Similar to this, a study conducted by Ashine (2021)

discovered that the issue of internal displacement in Ethiopia had become a formidable burden due to the rise in inter-ethnic conflict, recurring droughts, and seasonal floods. In examining the causes of displacement in pastoralist communities in arid and semi-arid lowland regions of Ethiopia, it was discovered that drought-related displacement in Ethiopia is a long-term, but immediate problem and that those who have been uprooted prefer to settle in their new communities rather than go back home (Tesfaw 2022). These internal displacements of pastoralists are not well-received by the hosting areas and they further exacerbate conflicts among different ethnicities where some ethnic groups feel that they are superior to others and hence think that have more rights to prime grazing lands in areas beyond their own.

The climate of the Somali region has over the decades forced pastoralists to develop survival strategies that have included violent cattle raids and other livestock raids on its neighbouring regions. The people of Somali region participate in additional livestock raids during dry years (Meier *et al.* 2007). The shortage of pastures, partially caused by droughts, is another source of conflict, as pastoral groups contend over decreasing resources (Hundie 2010). In the Somali region, livestock are raided from inside the same clan or from other clans or ethnic groups, as a means to, for instance, cope with the impact of drought (Markakis 2011). Livestock raiding from inside the same clan or ethnic group redistributes resources within the clan and characteristically does not lead to inter-communal conflict, as the raided group reciprocates in the future and the traditional conflict resolution mechanisms settle the quarrels. Livestock raids that occur between ethnic groups generate conflict between communities (Belay *et al.* 2005). Inter-ethnic livestock raids along the Oromia–Somali border, for instance, are used for intimidation and access to pastures, particularly in ranges where there is competition for grazing lands. Inter-ethnic livestock raids likewise prolong violence since they encompass revenge as pastoralists take part in raids and counter-raids. Livestock raids are in addition done for commercial purpose. Therefore, once seized, the livestock are straightaway traded either in local markets or across the border in Djibouti (Beyene 2017).

In the same way, cattle raids and natural resource rivalry, together with land and water resource quarrels which occur either between farming communities and pastoralists or between pastoral clans, have been inherent in the Somali pastoral ecosystems for a long time. Such rivalry and cattle raids frequently have profound belief systems and

age-old traditional practices (Hegazi *et al.* 2022; Mussa *et al.* 2017). Cattle raids and rivalry frequently become violent, and pastoral societies have come with numerous traditional and customary methods to prevent and resolve conflict. The Somali clan elders have a major role in customary law, as they mediate in quarrels between clans and negotiate settlements on compensation, and furthermore lead in traditional practices of forgiveness (Muluken 2020). Consequently, the Ethiopian government likewise recognised this as a conflict resolution approach, which was integrated in the Somali government (Hegazi *et al.* 2022; Mussa *et al.* 2017). Conflict will always be there as long as the climate change continues and the Ethiopian government has no coping mechanisms for the drought stricken arid regions of the country.

4.7.2 Food insecurity-related conflicts among pastoralists in the Somali region

The majority of the land of Ethiopia is very vulnerable to climate extremes that affect the food production and hence availability of food. The local flashpoints of food insecurity in the Somali region and the neighbouring regions, like Tigray and Afar correlate very well with the higher frequency of occurrence of conflicts as these areas are prone to climate security risks due to the arid and semi-arid climate. Food insecurity often leads to conflicts over critical resources such as water, pastureland, and food supplies. As resources become scarcer, competition intensifies, resulting in violent clashes between pastoralist groups and between pastoralists and farmers. These conflicts can result in loss of life, displacement, and further deterioration of food security (Dereje, 2018).

Generally, food insecurity among pastoralists in the Somali region is primarily driven by climate-related factors. This is and exacerbated others factors like by restricted access grazing lands, markets and basic services. During severe droughts the pastoralists become vulnerable as their livelihood is threatened. Most of the traditional coping mechanisms of the pastoralists, such as seasonal migration in search for water sources and grazing pasturelands, are increasingly strained by the unpredictable weather patterns, and thus aggravating food insecurity and economic instability (Tsegaye 2015).

During periods of long protracted and severe droughts, livestock mortality rates rise sharply, depriving pastoralists of their primary source of food and income (Kassahun

et al. 2020). The limited access to markets and high food prices further aggravate food insecurity, because pastoralists struggle to sell livestock or purchase essential food items during such periods (Beyene, 2019). Therefore, the income from livestock production and sales is not enough to adequately sustain the families of pastoralists. According to WHO (2022), between late 2021 and mid-May 2022 as an estimated 2.5 million animals perished due to drought, which exacerbated the food insecurity among pastoralists in these regions as they could not afford to buy enough food, which causes significant gaps in their dietary intake. A key sign of this worrying situation is the high frequency of cattle deaths. Over 1.5 million livestock deaths have occurred in the Somali, southern Oromia, and SNNP regions, according to figures given as of April 2022, and another 2 million animals are at risk. Hegazi *et al.* (2022) adds that a strategy used by pastoralists in the Ethiopian-Somali region for coping with drought is altering their patterns of migration.

The traditionally accepted practice of cattle raiding among pastoralist communities in Ethiopia to replenish lost herds following drought is a coping mechanism during severe drought conditions. However, this common practice often exacerbated by food insecurity. Inter-communal cattle raiding has become more frequent with levels of combat beyond any historical precedent in the Horn of Africa resulting in human deaths and theft of livestock (Mkutu, 2000; Mkutu & Marani, 2001). This practice not only causes violence conflicts among the pastoralist communities, but also disrupts livelihoods and exacerbates food insecurity because all productive labour is arrested as all attention and human resources are directed toward combative engagement (Beyene, 2019). Consequently, pastoral communities are diverted more resources to arming themselves because guns are seen as an economic investment. Obviously to protect themselves against cattle raiders from neighbouring hostile communities, defend their livestock against other armed pastoral communities (Mkutu & Marani, 2000).

Limited access to markets and economic opportunities also contributes to food insecurity. Cross-border trade by one group may be considered as illegal by another group and this can trigger conflict because sometimes confiscation of livestock and killings may happen on the way back from the market (Michael, Hadgu and Ambaye, 2005). Pastoralists often face challenges in selling their livestock and accessing

affordable food supplies. Market fluctuations, transportation issues, and lack of financial services hinder their ability to cope with food shortages (Tsegaye 2015).

Nevertheless, when availability of natural resources decreases and competition becomes stronger, the threat of violence also increases. Indication from diverse settings puts forward that food and livelihood insecurity escalate grievances and can negatively impact peace and stability (Delgado *et al.* 2021). The frequency of violence related to livestock raids is reported to increase during unusually wet and unusually dry years. Some indications suggest that pastoral groups in the Somali Region participate in additional livestock raids during the dry years, confirming greater scarcity (Raleigh and Kniveton, 2012). Nonetheless, other studies in the extensive region show that livestock violence becomes more intense in wet periods indicative of more violence in periods of abundance (Ember *et al.* 2014). In order to manage the impacts of drought, livestock is frequently raided inside the same clan, or between different clans. This does not essentially result in conflict, as it is part of traditional resource sharing methods achieved by means of indigenous conflict resolution approaches. Nevertheless, in comparison to intra-clan livestock raids, inter-ethnic or inter-clan livestock raids frequently result in conflict between communities since there are few or no methods for conflict resolution or compensation between such groups (Belay *et al.* 2005). Consequently, in times of drought, the frequency of intra-clan livestock raids can decrease, while inter-clan or inter-ethnic livestock raids increase, resulting in additional violent conflict between communities (Hegazi *et al.* 2022).

External shocks, such as weather perils and swarms of locusts, that threaten natural resources have an increased probability of concurrently worsening these conflicts as mentioned Chapter 3. This insecurity has increased recurrently during numerous incidents in current Somali history and is predicted to increase in intensity and frequency as the impacts of climate change get worse (Hegazi *et al.* 2022; IOM and ICPALD 2022). Lastly, it is imperative to emphasise that degradation of the environment contributes to insecurity, but then again insecurity likewise impacts the environment. These feedback loops can be considered as mutually reinforcing each other, instead of being considered to be one linear pathway. Conflicts between farmers and herdsman, or between pastoral clans lead to widespread insecurity that limits the options of pastoralists to protect their livelihoods, frequently necessitating that the

pastoralists stay in safe areas near urban areas. Intensive grazing and over-exploitation of these areas in turn causes environmental degradation. In addition, accessibility to fertile areas for households can moreover be very much unequal, changing depending on social networks, herd size and how wealthy the household is (Destrijcker *et al.* 2023). Farmers, herdsman, pastoralists all compete for land and water sources and resort to migrate further and away from their normal bases during the severe drought spells.

Among the most significant livelihood tactics for pastoral societies are migration and freedom of movement. Transhumance² is not only a vital aspect of the livestock production system and an intrinsic part of pastoral life, it furthermore assists pastoral communities to reinforce their resilience and capacity to adapt to different stressors. Nevertheless, if movement patterns are altered, they too can develop into a source of extreme demographic pressures that can cause strains between and inside communities. This is particularly noticeable whenever changes in migration take place in a ill planned, unmanaged, abrupt, or forced approach (Ahmed and Bihi 2019; Destrijcker *et al.* 2023: 29).

Although migration has been frequently successful as a strategy of adaptation and risk management for nomadic pastoralists, it too has high risks. Migration places extra stress on already weak livestock, particularly if routes become longer or more difficult. Increased numbers of livestock in limited areas, for instance in reduced areas of fertile grazing lands, have likewise been favourable to the fast spread of transmissible diseases. In the worst-affected areas of the Somali Region, families depend on their livestock, mostly sheep, goats, cattle and camels. In addition, these households have also experienced the death of most, or all, of their livestock due to scarcity of fodder and water (Davies *et al.* 2016) which forces them to move from their areas in search of fodder for their livestock.

Somali herdsman therefore encounter involuntary migration and displacement. Extreme weather events in the Somali Region have in recent years forced thousands of families from their homes into displacement camps. The Somali Region has experienced an uninterrupted arrival of refugees and IDPs for years, plus in and

² Transhumance is the efficient use of resources in the rearing of livestock, done by migrating livestock on a seasonal basis to pastures across different ecological regions (Ocak 2016).

around urban centres and in highland areas, resulting in stress on host communities (Davies *et al.* 2016). The latest drought has likewise forced pastoralists of Ogaadeen (of Somali Region) to cross over to Somaliland and, in mid-2022, some 3 000 households and their livestock had arrived in various parts of Somaliland (Abdi 2021). Consequently, this cross-border migration of pastoralists with their livestock, called transhumance, is a potential source of conflict among the pastoralists in these regions as they compete for the same resources for their livestock.

Transhumance-related violence frequently occurs in regions that are rich in natural resources, but not in zones that are environmentally degraded. As nomadic pastoralists evacuate drylands or unsuitable lands in search of pastures and migrate to fertile range lands in addition to agrarian areas in search for drought-free environmental conditions, the agrarian lands are as a result exposed to demographic pressures, leading to increased rivalry and conflict over natural resources. Drought-affected pastoral lands therefore continue to be comparatively peaceful, whereas the less arid lands with grazing prospects risk becoming more insecure (Mcguirk *et al.* 2020). While transhumance-related violence and herder-farmer conflicts in contemporary history in the Somali Region continued to be comparatively few, the status quo can rapidly worsen if climate stressors and the accompanying quarrels are not dealt with properly. If this happens, the Somali Region could experience increased transhumance conflicts as reported in other areas of the wider African region, such as in Somalia, Nigeria and Liptako Gourma (Destrijcker *et al.* 2023). If Ethiopia could develop its infrastructure, it could supply some if not all the regions with fresh water from the highlands.

Ethiopia has an abundance of water sources which in theory permits sufficient supply for everyone; however, challenges in geographical or topographical location and inconsistencies in historical administration of water supplies hamper proper management of water supplies and its unbiased distribution (Flintan and Tamrat 2002). Local conflicts, especially in pastoral lands, have a tendency to geographically overlap with water supplies (Flintan and Tamrat 2002). Water sources in the form of ponds, wells or boreholes are vital for both farming and pastoral communities as they need them to maintain their livelihoods particularly the during dry spells. Nevertheless, the operations of rural water facilities are not continuously properly maintained and decline with the frequency of conflict. In the absence of local ownership, access to

safe drinking water supplies declines (Gurmessa and Mekuriaw 2019). Countless households consequently rely on unprotected water sources such as rivers, lakes, springs and traditional wells for their daily requirements (Chinasho *et al.* 2017). Deep wells are a prevalent source of water for pastoralists during the dry season, nonetheless access is frequently managed by well-owning clans who do not condone use of these resources without prior arrangement (Temesgen 2010). Due to relentless droughts and environmental degradation, access to these deep wells and their surrounding grazing pastures are the centre of quarrels (Temesgen 2010). Irrigation has time and again been established along river banks in lands traditionally used by pastoralists, consequently restricting their access to water sources and pastures in the dry season (Sax *et al.* 2023). In this way, development of agricultural production has amplified pressure and competition over natural resources (Sax *et al.* 2023). Resource-based conflicts due to competition for pastures are exacerbated by land tenure policies that favour private procurement of land and market-controlled methods of land development at the expense of communal usage of land. This negatively impacts pastoralists since depletion of natural resources occurs in the remaining pastoralist land after the annexation of the vital grazing land (Mohamed 2018; Temesgen 2010).

Due to competition over scarce natural resources such as water and land for pasture, the Somali region has experienced an escalation of conflicts, mostly between the Oromo, Afar, and Somali ethnic groups. These three ethnic groups share porous and disputed territorial boundaries. These conflicts are more prevalent during prolonged droughts and periods of insufficient rainfall because pastures and water resources become scarcer during these periods. The situation has been exacerbated by the prolonged drought, which has killed over a million livestock. The region's resource scarcity is made worse by the influx of refugees and expanding population. Moreover pastoralism has traditionally been the primary source of income in these semi-arid and arid regions.

Climate change-related droughts and the consequent losses in livestock have worsened the food insecurity situation in the region, making it more difficult for pastoralists to obtain sufficient nourishment. Furthermore, pastoralists have altered their migration patterns in an effort to cope with the consequences of climate change, exacerbating food insecurity and sparking more conflicts over grazing land for

livestock and water resources. It should be noted that disputes over land, livestock raids which are part of the pastoralists tradition and history as well as cattle rustling have detrimental effects to the livelihoods and stability in the region. The increasing number of dry seasons and recurrent droughts have resulted in the loss of assets and life among the pastoralist communities. Conflicts in the region are also triggered by a variety of issues, including unequal resource distribution, housing expansion, distrust between ethnical groups, and lack of accessibility to water and pastures. It is clear that Climate change, characterised long and recurring droughts heightening food insecurity and exacerbating resource-based conflicts in the region. The evidence provided underscores the major role climate change and food insecurity exacerbate conflict in the Somali Region. Droughts in particular drive pastoralists to compete over scarce natural resources such as land, pasture and water, which contributes to conflict between pastoralist communities. Furthermore, the region's patriarchal clan system and customs, which form the basis of governance in the region, make resolving conflicts more difficult.

4.7.3 Federal governance policies and weakened traditional governance

In post-colonial Ethiopia, a range of policies pursued by successive governments has led to the marginalisation of pastoralists from mainstream national development. There has been a tendency to neglect the needs of pastoralists and to focus on the interests of agriculture and urban dwellers, thus marginalising other stakeholders to the extent of even of envisioning the gradual eradication of pastoralism. Moreover, governance in the pastoral regions is dominated by the federal government's manipulation of ethnicity, patronage and a political culture of exclusion. Consequently, is that the pastoralists are still not proportionally represented in education, economic life and political life.

Governance in the pastoral regions is dominated by manipulation of ethnicity, patronage and a political culture of exclusion. Despite the effort of the federal government, the pastoralists are still not proportionally represented in education, economic life and political life. Access to education by pastoralists has been hindered by numerous factors, which include local customs, traditions that are hostile to change, the nomadic lifestyle, and increasing insecurity (Davies *et al.* 2016).

The majority of pastoral land resources are held under a controlled access system which is communal in form. 'Communal' land tenure relates to that system of tenure in which the tribe or clan or a group has access to land. Tenure is thus a social institution: a relationship between individuals and groups or tribes consisting of a series of rights and duties with respect to the use of land (Davies *et al.* 2016). Permission to use land and resources is first and foremost granted to members of 'the group', which could be defined by ethnicity, kinship, lineage, clan, geography or another category (Cousins, 2007). These policies have inadvertently weakened the traditional governance systems among pastoralist communities.

The weakened traditional governance and the lack of pastoral land tenure security system in pastoral areas in Ethiopia has also contributed to the rise in violent conflicts among pastoralist communities. Traditionally, African societies, especially among rural communities, were dominated by elders who were responsible for the governance of the community. There were established communal structures for conflict resolution through councils of elders, traditional courts and peer or age-group supervision, where each individual or group had to meet certain social expectations (Quam, 1996). Complaints arising from marginalisation by the central government federal land distribution, regional borders and issues of sovereignty, including access to natural resources, have for a long time been in existence and continue to bring about resentment amongst the Somali public. Furthermore, lots of pastoral lands in the Somali region have an extremely low number of investments in infrastructure and social services development from the central government (Fratkin 2014). For a long time, nomadic pastoralists have not had secure legal entitlements to their communal lands. This makes them susceptible to losing their lands in these areas through agricultural and industrial development efforts of the central government (Fratkin 2014). Throughout modern history, government interventions in the Somali region have always been received with suspicion and, frequently with open violent resistance (Warfa 2021; Hagmann 2014; Hagmann 2020). Tenaw (2016), states that climate change is the main force modifying the practices of the pastoralists, such as communal land use system and prompting the development of coping and adaptive strategies to support livelihoods (Habibullah *et al.* 2013). These innovative strategies and the associated land use changes are currently instigating conflict in the pastoral areas of the Somali regional state (Beyene 2017; Gena and Jarra 2023). Therefore, one of the

ways to alleviate these climate change related conflicts among pastoralists is to have equitable distribution of grazing lands within the region.

The Somali region has been marginalised by the central government for long time, hence the people of this region do not trust the government and do not like to work with it, because they are suspicious of the central government. Along with access to land, water and pastures, other causes of pastoral conflicts in the Somali region are the dread of housing expansion, inter-clan distrust, discriminatory power sharing, and imbalanced distribution of resources, absence of fair employment, ease of access to weapons, and the revenge of past maltreatment in the community (Hussein 2022). In the Somali region, governance operates mainly through a patriarchal clan system based on principles of communal and unrestricted access to natural resources. Consequently, most of the conflicts in the Somali region are therefore, dealt with through customary standards embedded in clan laws rather than through state authorities, which have very little legitimacy in rural areas and among pastoralists (Muluken 2020).

4.8 Conclusion

This chapter established that pastoralists in Ethiopia occupy 61% percent of the nation's land mass. It also highlighted that pastoralists are predominantly found in four regions, namely Afar, Somali, Oromia and SNNP region. Livestock production serves as the main source of income and livelihood for pastoralists in the country. Pastoralists in Ethiopia have experienced recurring droughts due to climate change thus causing famine, the death of livestock and decline in livestock productivity. This chapter pointed out that the impacts of climate change result in the decrease of already scarce natural resources such as pasture and water sources in the country. The Somali region experiences the same challenges, in addition to that it is home to the largest population of pastoralists. The findings in this chapter pointed out that the region has been experiencing recurring droughts and persistent food insecurity as Somali pastoralists are mostly reliant on livestock as source of food and income. A decline in livestock has serious consequences for their food security. The region is very susceptible to climate change, as highlighted by the fact that nine out of eleven droughts that the country experienced between 1997 and 2021 were in the Somali region. Historically, the Somali pastoralists living along the borders with the Afar as well Oromo have disputed

for land for pastures and water resources. However, the conflicts have become more politicized. The current competition for land was triggered by Ethiopia's political transition towards federal restructuring which was aimed at connecting ethnicity, territory, and administrative boundaries. The Somali region has seen a high frequency of communal and ethnic conflicts between 2016 and 2022. However, these clashes tend to be frequent in times of droughts when pastoralists are in search of land and water resources.

CHAPTER 5. CONCLUSION: SUMMARY AND EVALUATION

5.1 Summary

The aim of this research is to analyse how and where climate change and food insecurity have exacerbated the conflict in Ethiopia from 2015 to 2022. The research problematised Ethiopia as an example of how climate change and food insecurity as factors that exacerbate violent conflict between social communities in Ethiopia with specific reference to pastoralists communities (Admassie and Abebe 2018; Kassahun 2020).

Chapter 1 discussed the research theme. The research theme of this study was to focus on the impact of climate change and food insecurity on pastoralist conflicts in Ethiopia from 2015 to 2022. The period 2015-2022 was identified because over the last seven years (from 2015-2022), Ethiopia has faced back-to-back droughts; the worst droughts the country has experienced in over 50 years. Climate change is the long-term alteration in the weather patterns of the Earth, including changes in temperature, precipitation, and wind patterns, which is due, primarily to the human activities, such as the burning of fossil fuels and deforestation, which lead to an increase in greenhouse gases in the atmosphere consequently leading to sustained increases in environmental temperatures. Ethiopia, located in the Horn of Africa is among the countries in Africa that are most susceptible to climate change due to the country's high reliance on rainfed agriculture. Climate change, particularly through droughts, has exacerbated food insecurity and escalated pastoralist conflicts over limited resources in the most vulnerable semi-arid and arid regions of Ethiopia. Ethiopia's vulnerability to climate-related challenges like droughts and floods threatens food security and livelihoods, particularly affecting the arid and semi-arid regions of the lowlands and causing substantial socio-economic and environmental consequences.

Chapter 2 discussed the conceptual framework. The conceptual framework for this study was constructed out of the review of literature on climate change, food insecurity, as well as conflict and pastoralists. A review of literature on climate change, food

insecurity, conflict among pastoralists was done in order to apply these concepts to Ethiopia in the subsequent chapters. Literature on climate change with specific reference to droughts, floods and declining agricultural productivity was reviewed. This was followed by a review on conflict with specific reference to resource based conflicts and on pastoralists a societal group.

Chapter 3 discussed the impact of climate change and food insecurity on Ethiopia. In Ethiopia, livestock fodder sources include open grazing on pasture lands, crop remains after harvest, and weeds from arable lands. Climate change can lead to fluctuations in fodder crop yields due to factors like heat stress, water shortage, and pest invasions, affecting the availability of crop residues for livestock feed. In Ethiopia, the major sources of livestock fodder are open grazing on pasture lands, grazing on crop remains left over after the harvests, and grazing on weeds from arable lands, with open grazing contributing the largest share of livestock fodder. Climate change causes increased fluctuations in crop yields as a result of factors like heat stress, water shortage, and pest invasions. These fluctuations directly affect the quantities of crop-leftover after harvests available for livestock to feed on. Rising temperatures and diminishing rainfall amounts negatively impact rangelands by shortening the growing season for grasses and causing a decrease fodder intake by livestock due to heat stress.

In the semi-arid and arid regions of Ethiopia pastoralism, livestock rearing, as a consequence of climate change, is severely affected by droughts, erratic rainfall patterns, reductions in rainfall and water accessibility inferior livestock productivity, degradation of grasslands, diminishing fodder species, and increasing incidences of livestock disease as well as livestock mortality as a result of reduced availability in quantity and quality of fodder. Consequently, the majority of people in the study area frequently suffer from food insecurity.

The geographical distribution and availability of both pasture and water depend on the pattern and availability of rainwater. Consequently, changes in climatic factors such as temperature, rainfall and the incidence and severity of extreme events such as droughts directly affect livestock productivity. Climate change decreases livestock productivity by reducing water availability, reducing fodder quality and quantity.

Climate change reduces fodder availability by shortening the growing season of grasses and creates favourable environmental conditions for pathogens and disease causing insects to survive, complete their life cycles and transfer diseases too the livestock. These conditions directly result in increased susceptibility of different livestock species to vectors and pathogens thereby affecting livestock in terms of health, growth and reproduction consequently diminishing the size of livestock herds, altering the type of fodder, quality and quantity, encouraging the transmission of diseases, decreasing livestock performance and maturity, altering the income and livestock prices in many parts of Ethiopia. Climate-driven events like droughts therefore lead to livestock losses, jeopardising pastoralist livelihoods and food security.

Ethiopia struggles with persistent food insecurity and famine, with historical episodes affecting millions. The rural communities, which constitute about 84% of Ethiopia's population, bear the brunt of food insecurity because the mainstream economic activity and their primary source of livelihood is rainfed subsistence farming. A protracted drought since 2020, along with successive failed rainy seasons, has affected 8.2 million people, particularly in regions like Somali, Oromia, and Southern Nations. Desert locust outbreaks have damaged crops and pastures in Ethiopia. Food insecurity often leads to famine, primarily caused by crop failure and livestock loss due to prolonged droughts and climatic variability. Addressing these complex issues is crucial to improving food security in Ethiopia.

Chapter 4 discussed the impact of climate change and food insecurity on pastoralists. Climate change and food insecurity in Ethiopia have been identified as major factors, exacerbating pastoralist conflicts in the country. As pastoral conflicts over pastures and water resources become more frequent, the impact of climate change on the availability and quality of water resources is likely to exacerbate these conflicts. Pastoralist regions of Ethiopia, due to their arid and semi-arid nature are characterised by recurrent droughts, causing famine, resulting in high livestock mortality that threatens pastoral sustainability. The size of rangelands that pastoralists rely on is decreasing due to a variety of factors such as population growth, agricultural invasion, land degradation, blocked migration routes, and ethnic conflicts triggered by the

shortage of natural resources. The conflicts covered are those between the Somali and Oromo pastoral groups and also between the Somali and Afar pastoral groups vying for grazing lands and water resources for their livestock in the arid and semi-arid regions of southern and south-eastern Ethiopia.

The livelihoods of pastoralists depend almost entirely on livestock therefore, the significance of livestock production plays a pivotal role in the financial well-being, economic stability, and sustenance of millions of pastoralists globally, hence any event that disturbs the ecological balance of the rangeland ecosystem directly affects their livelihood. It is predicted that the rising temperatures as a result global warming will have negative impacts on arable land and, water resources and declining agricultural and livestock production could intensify and thus challenge in food security, and the livelihood of communities in these areas.

The livelihoods of pastoralists and food security are under threat in Ethiopia's arid and semi-arid regions due to the increasing effects of climate change. The recurring droughts that afflict these regions, which are largely inhabited by pastoral communities, are directly responsible for the ongoing decline in the quantity and productivity of livestock. Pastoralists continue to uphold their way of life in spite of these challenges by using their traditional knowledge and indigenous methods to deal with the effects of climate change. Climate variability and adverse weather conditions are recurring challenges for the nation of Ethiopia, putting tremendous strain on its natural resources, especially its water reservoirs and grazing lands. The ethnic federalism system has made matters worse by fuelling tensions amongst pastoralist communities as they compete for control of these finite resources. There are frequent droughts and persistent food shortages in areas like the Somali region, where a significant pastoralist population reside. As a means of providing pastoralists' livestock with remnants from farmed crops, rainfed agriculture is vulnerable to the effects of climate change, and this exacerbates the problems.

Due to its limited natural resources, the Somali region of Ethiopia continues to experience difficulties that have been made worse recently by climate-related factors such pest infestations, floods, and droughts. Swarms of desert locusts caused havoc over East Africa between 2019 and 2021, decimating the region's fodder crops,

agricultural fields, and essential vegetation. Water scarcity is the main cause of the Somali region's struggles with food insecurity and malnutrition historically. Seasons with limited precipitation drastically diminish the amount of pasture available to livestock which affects pastoralists' capacity to feed their families. Pastoral communities experience widespread poverty, increased disease prevalence, and household food insecurity as a result of losses in livestock during droughts. An excessive reliance on seasonal rainfall to sustain livelihoods exacerbates competition for pastures and water sources resulting in conflict.

The conflicts between Somali and Afar pastoralist communities and between Somali and Oromo pastoralist groups are the primary focus of this study. These conflicts are the result of pastoral communities' dissatisfaction with how pastures and water resources are used and shared in areas vulnerable to extreme weather events such as droughts, famines and poverty. These tensions, which were initially based on traditional livestock raiding and rivalry for resources, changed into border clashes after the state reorganised in 1991. Climate change intensifies previous territorial disputes and exacerbates existing conflicts, especially when it comes to scarce resources like pasture lands and water that are essential for pastoral livelihoods.

The Oromo, Afar, and Somali pastoralist communities are in constant competition with one another over scarce natural resources, which is a major cause of ethnic tension in Ethiopia's southern and eastern border regions. Ill-defined regional boundaries exacerbate ethno-political tensions, which worsen in times of drought and insufficient precipitation. Pastoralists now have less access to land due to changes in land ownership from community to private ownership in the Somali region, which has exacerbated conflict. Historically, Somali pastoralists have seasonally migrated in search of pasture and water, and this migration has been a major cause of conflict with communities that they share borders with.

Resources can be redistributed within a community without resulting in major intercommunal conflict when livestock raids within the same clan or ethnic group occur, since traditional conflict resolution techniques and reciprocal acts are usually used. Conversely, interethnic livestock raids exacerbate conflicts between communities through intimidation, retaliation, and access to pastures. One example of

such raids is along the border between Oromia and Somali regions. The Somali region has furthermore been impacted by small-scale, localised communal and ethnic conflicts, specifically compelled by food insecurity or livelihood insecurity, and lack of access to land and natural resources. Inter-ethnic conflicts frequently happened in border areas for instance, between Afar and Oromia regions and from 2016 to 2018, a fresh outbreak of clashes between the peoples of Somali and Oromia regions displaced millions.

5.2 Key research findings

The key findings of this study are summarised below by answering the research question and sub-questions that were provided in Chapter 1.

5.2.1 How can climate change and food insecurity account for an exacerbation in violent conflict involving pastoralist communities in Ethiopia from 2015 to 2022?

This study finds that Climate change and food insecurity has exacerbated conflict in Ethiopia from 2015 to 2022. The region identified is the Somali region. The Somali region is home to the largest population of pastoralists in Ethiopia. The Somali region is extremely vulnerable to climate change, and this has manifested through recurring droughts and high levels of food insecurity. The Somali region is a region that is known to suffer from resource scarcity. In addition to that pastoralists are heavily dependent on natural resources such as land and water. These resources are essential for the production and upkeep of livestock. Keeping in mind that pastoralists are already competing for scarce resources the impact of climate change on the region has worsened the situation. The average temperature in the Somali region has been increasing constantly due to climate change and as a result droughts have been a common theme. The Somali region has experienced nine out of eleven droughts that have impacted the nation between 1997 and 2021.

It has been established that the Somali region is one of the most arid in the country, and recurring droughts cause food insecurity. This is due to the fact that pastoralists are extremely reliant on rainfall and rainfed agriculture in order to feed and water livestock. The findings of this study state that as of December 2016, there has been

an increase in the number and intensity of resource-based conflict between Somali and Oromo pastoral tribes at the border between the Oromia and Somali Regional State. The Somali region has furthermore been impacted by small-scale, localised communal and ethnic conflicts, particularly induced by food insecurity or livelihood insecurity, and lack of access to land and natural resources. The dwindling natural resources as established are a result of climate change.

The fighting between ethnic Somali and Oromo populations along the borders of the Fafan district in the Somali region and the East and West Hararghe zones in the Oromia region is an example of the heightened inter-ethnic conflicts. After months of tensions along the Somali/Oromia border area, mostly sparked by rivalry over vital resources, these ethnic disputes culminated on August 4, 2018, in violent attacks against ethnic minorities in Jigjiga city. The above findings show the link between the competition for scarce natural resources in border areas between Somali and Oromo communities result in inter-ethnic conflicts. These conflicts that occurred between 2016 and 2018, show how historical tensions, territorial disputes, and competition for scarce resources interact in an intricate manner, all of which are made worse by the negative impacts of climate change. Resource-based conflicts have become more intense, as seen by the border skirmishes between Somali and Oromia regions and the violent attacks on ethnic minorities that followed. These conflicts are becoming more intense and frequent due to the limited availability of resources brought about by climate change. Changing weather patterns, such as protracted droughts and erratic rainfall patterns, make it harder to obtain natural resources, such as pastures and water. It should be noted that Inter-ethnic conflicts arise from tensions between pastoralist communities as they compete more fiercely for limited resources. Given the ongoing drought, which has increased resource competition and escalated tensions, it is reasonable to attribute the exacerbation of these conflicts to both climate change and food insecurity.

The escalation in conflicts along Afar's border region and Somali region which resulted in a large number of displaced people, is closely linked to the negative effects of climate change and food insecurity. Due to shifting climatic trends, the disputed kebeles; more especially, Adaytu, Garba-Issa, and Cundhufo, have emerged as major flashpoints for long-running conflicts. Conflicts and skirmishes between farmers and

pastoralists in the area are greatly intensified by conditions brought on by climate change, such as reduced precipitation during the long rainy season. Tensions have increased even more since these kebeles were incorporated into the Afar regional state, supposedly giving them political autonomy as "special kebeles."

Negative impacts of climate change such as lengthy dry seasons and erratic rainfall intensify the struggle for political control and resource autonomy. As resources become scarcer, the pastoralists communities especially the Somali pastoralists and the Issa clan—find themselves embroiled in more violent conflicts over disputed lands. Climate change is functioning as a contextual exacerbator for the conflicts, as evidenced by the 2021 involvement of regional armed troops from both Afar and Somali populations. The rising severity and frequency of conflicts during dry spells coincide with regions that tend to grapple with high levels of food insecurity and climate variability.

Between 2015 and 2022, Ethiopia experienced an intersection of food insecurity and the effects of climate change, which greatly exacerbated conflicts among pastoralists. During this period, droughts became more severe and frequent due to climate change, resulting in severely reduced pasture and water resources. This has created a competitive environment for pastoralists communities. Given that pastoralists relied on rainfed agriculture and traditional methods for managing their livestock, they were more susceptible to the negative consequences of shifting precipitation patterns and extended dry seasons. Food insecurity resulting from reduced livestock productivity and reduced crop yields as a result of climate-related variables, exacerbated the challenges faced by pastoralist communities. Extreme weather conditions increased livestock losses, which not only reduced an essential food source but also undermined the pastoral economy. Tensions increased due to the lack of food resources, which resulted in conflicts over the limited resources. Resource-based conflicts have grown more prominent in Ethiopia due to pastoralists conflicting over natural resources such as reduced pastures for grazing and water sources. Disputes with historical roots have become more common and violent due to the negative impacts of climate change. Furthermore, disputes over territories and resources resulted from pastoralists seeking alternative migration patterns to adapt to the changing conditions thus bringing about more conflicts.

To further explore the research question, the following sub-questions were examined:

- What is the link and relationship between climate change and food insecurity?

The persistent droughts in Ethiopia were nationwide, but they were worse in the arid and semi-arid regions of the east and south eastern regions of the country with the Somali region being the region where climate change induced food insecurity had intensified conflict from 2015 to 2022 due to a number of factors, which included alterations in temperature and rainfall patterns. Between 1997 and 2021 Ethiopia had experienced a minimum of nine intermittent droughts and the in 2019 and the whole Somali region was in crisis due to acute levels of food insecurity. By October 2020, it was estimated that 8.6 million people were experiencing food insecurity in the Ethiopia, of which 1.25 million were in the Somali region.

- How and when is violent conflict exacerbated by climate change and food insecurity?

Pastoralists of the Somali region were the most affected by conflict in climate change induced food insecure regions of Ethiopia during the 2015-2022 period of study. These pastoralists had pastoral conflicts with both their neighbours in Afar region and in Oromia for pastures and water sources for their livestock. Due to the harsh arid climate of Somali region, the Somali pastoralists suffered both livelihood insecurity due to high mortality of their livestock as a result of high temperatures, poor grazing lands, lack of water and they also suffer from high food insecurity as they do not have enough meat and protein to meet adequate dietary needs. This food insecurity further led to malnutrition and famine among the pastoral communities of the Somali region. The Somali Region was furthermore impacted by small-scale, localised communal and ethnic conflicts, caused by food insecurity or livelihood insecurity, and lack of access to land and natural resources. Also, pastoral areas in the Somali region in particular, were traditionally susceptible to conflicts at pastoral community level.

Can climate change and food insecurity demonstrate a proclivity for violent conflict in Ethiopia over a specific period that involves pastoralist groups?

The dwindling grazing lands and water resources, increased rivalry among the pastoralists groups, thus exacerbating tensions that existed. The number and intensity of resource-based conflicts since December 2016 had increased between Somali and Oromo pastoral tribes at the border between the Oromia and Somali due to food insecurity or livelihood insecurity, and lack of access to grazing land and natural resources. Cattle-raiding, land disputes between farmers and pastoralists, and conflicts between clans over territory and natural resources were an inherent part of pastoral life, had for a long time been an inherent part of pastoral life in Somali region and they increased during the period of study as the resources were continuously diminishing in both quality and amounts.

There were frequent inter-ethnic conflicts in border areas between Afar and Oromiya regions and from 2016 to 2018, a fresh outbreak of clashes between the peoples of Somali and Oromia regions displaced millions. These ethnic conflicts climaxed in August 2018, in violent attacks on ethnic minorities in Jijjiga city, following months of hostilities along the Somali/Oromia border area, primarily driven by rivalry over the critical resources.

Inter-ethnic conflicts frequently happened in border areas between Afar and Oromiya regions and from 2016 to 2018, a fresh outbreak of clashes between the peoples of Somali and Oromia regions displaced millions.

In 2020, almost 1.25 million people in the Somali region experienced severe food insecurity due to factors that included changes in temperature and rainfall patterns. Uncommonly dry rainfall seasons decreased the quantities of crop remnants left after harvesting, for livestock to feed on, and also decreased pastures in both quality and quantity such that the health of livestock was compromised. Weakened livestock is susceptible to diseases and high mortality rates led to food insecurity for pastoralists. Nonetheless, in the Somali region, pastoralists and have over the years developed some survival strategies for surviving the droughts. These strategies included

changing migration patterns for their livestock, raiding livestock, hawking belongings and being involved in jobs that pays in wages. Changing of livestock migration patterns linked the impacts of climate change with livelihood insecurity and food insecurity, and created inter-communal conflicts as pastoralists clashed over water resources and pastures.

In 2021, the long-standing inter-ethnic conflict between Afar and Issa-Somali clan communities over several disputed kebeles in border areas became more intense, with the participation of regional armed forces from both sides. That same year 39,000 people were displaced in Afar due to the ongoing conflicts and more than 67,000 people in the Somali region. Other armed clashes in August 2022 between Afar and Somali ethnic militias in Cundhufo kebele in the Gewane woreda and Danlahelay in Siti zone in the Somali region displaced thousands of civilians.

Food insecurity was extremely severe for pastoralist groups between late 2021 and mid-May 2022 since as about 2.5 million livestock died because of drought. Over In the Somali, southern Oromia, and SNNP regions, more than 1.5 million livestock had died by April 2022, and another 2 million were at risk to die due to drought too. As they have little access to available livestock, Since pastoralists in the Somali regions lost much of their livelihood due to livestock mortality, and could not afford adequate food, they suffered from food insecurity and the consequential malnutrition and famine.

As a result of armed clashes between Afar and Somali ethnic militia some being pastoralists too in August 2022, in Cundhufo kebele in Gewane woreda and Danlahelay in Siti zone in the Somali region, thousands of civilians were displaced. The three kebeles of Adaytu, Garba-Issa, and Cundhufo were integrated to the Afar regional state through an agreement signed by the regional states, Somali and Afar. In conclusion, the pastoralists most affected by climate change, food insecurity and conflict are those in the Somali region as it is an arid region where traditionally, transhumance was practiced without any restrictions of movement of pastoralists and their livestock. Unfortunately, the pastoralist conflicts between the Somali and Afar and between the Somali and Oromo have transformed into territorial conflicts. Climate change and food insecurity in isolation cannot cause conflict or exacerbate conflict. However, when preexisting conditions or historical grievances are present, it can play a significant role in sparking conflict. There is an urgent need to address the complex

interactions between environmental, social, and economic factors through integrated and wide-ranging approaches. The study emphasises how the impacts of climate change and food insecurity significantly exacerbates conflicts among pastoralist communities, which are not only motivated by historical or political issues. The findings demonstrate the linked vulnerabilities that pastoralist groups face, with food insecurity and the conflicts that result in being triggered by climate change. Comprehending these links is crucial for formulating focused and efficacious interventions.

BIBLIOGRAPHY

Abay, K.A. and Jensen, N.D. 2020. Access to markets, weather risk, and livestock production decisions: Evidence from Ethiopia. *Agricultural Economics*, 51 (4): 577-593.

Abbink, J. 2006. Ethnicity and conflict generation in Ethiopia: Some problems and prospects of ethno-regional federalism. *Journal of Contemporary African Studies*, 24 (3): 389-414.

Abdi, M.M. 2021. Regularly irregular: varieties of informal trading in the Ethiopian-Somaliland borderlands. *London/Nairobi: RiftValley Institute*.

Abdu, N.H. and Robinson, L.W. 2017. Community-based rangeland management in Dirre rangeland unit: Taking Successes in Land Restoration to scale project. *ILRI Project Report*.

Abdulahi, M. 2005. The changing nature of pastoral conflicts in south-eastern Ethiopia: the case of the Boran and Digodi pastoralists. Africa Peace Forum, Pastoralist Concern Association Ethiopia, Interafrica Group, Saferworld.

Abebe, A., Eik, L.O., Holand, Ø., Ådnøy, T. and Tolera, A. 2012. Pastoralists' perceptions of feed scarcity and livestock poisoning in southern rangelands, Ethiopia. *Tropical animal health and production*, 44: 149-157.

Abo-El-Wafa, H., Yeshitela, K. and Pauleit, S. 2017. Exploring the future of rural–urban connections in sub-Saharan Africa: modelling urban expansion and its impact on food production in the Addis Ababa region. *Geografisk Tidsskrift-Danish Journal of Geography*, 117 (2): 68-81.

Abrahams, D. 2020. Conflict in abundance and peacebuilding in scarcity: Challenges and opportunities in addressing climate change and conflict. *World Development*, 132: 104998.

Abrahams, D. and Carr, E.R. 2017. Understanding the connections between climate change and conflict: Contributions from geography and political ecology. *Current Climate Change Reports*, 3: 233-242.

ACAPS. 2023. Ethiopia Impact of drought: Oromia and Somali regions. Thematic report. Internet: <https://www.acaps.org/en/countries/archives/detail/ethiopia-impact-of-drought-in-oromia-and-somali-regions>

Adams, C., Ide, T., Barnett, J. and Detges, A. 2018. Sampling bias in climate–conflict research. *Nature Climate Change*, 8(3): 200-203.

Addis Standard. 2022. News: Somali region says thousands displaced in clashes bordering Afar state; victims in dire need of aid. Internet: <https://addisstandard.com/news-somali-region-says-thousands-displaced-in-clashes-bordering-afar-state-victims-in-dire-need-of-aid/> Access: 4 May 2023

Adger, W.N., Arnell, N.W., Black, R., Dercon, S., Geddes, A., Thomas, D.S.G. 2015. Focus on environmental risks and migration: causes and consequences. *Environ. Res. Lett.* 10: 060201.

Adger, W.N., Pulhin, J.M., Barnett, J., Dabelko, G.D., Hovelsrud, G.K., Levy, M., Oswald Spring, U. and Vogel, C.H. 2014. *Human security*. Cambridge University Press.

Adhikari, U., Nejadhashemi, A.P. and Woznicki, S.A. 2015. Climate change and eastern Africa: a review of impact on major crops. *Food and Energy Security*, 4 (2): 110-132.

Adhvaryu, A., Fenske, J.E., Khanna, G. and Nyshadham, A. 2018. *Resources, conflict, and economic development in Africa* (No. w24309). National Bureau of Economic Research.

Admassie, Y., & Abebe, A. 2018. Climate Change and Inter-Communal Conflict in Ethiopia: The Case of the Afar and Somali Pastoralists. *Journal of Peace Research*, 55(3): 393-407.

Adnew Degefu, M., Assen, M., Satyal, P. and Budds, J. 2020. Villagization and access to water resources in the Middle Awash Valley of Ethiopia: implications for climate change adaptation. *Climate and Development*, 12 (10): 899-910.

Affoh, R., Zheng, H., Dangui, K. and Dissani, B.M. 2022. The impact of climate variability and change on food security in sub-saharan africa: Perspective from panel data analysis. *Sustainability*, 14 (2): 759.

Africa Watch. 1991. Evil Days: Thirty Years of War and Famine in Ethiopia. London: Human Rights Watch.

Ahmad, N., Alam, Z., SK, S. and Husain, M. 2021. Food Insecurity: Concept, Causes, Effects and Possible Solutions. *IAR Journal of Humanities and Social Science*, 2 (1): 105-113.

Ahmed, M.E, and Bihi, M.A. 2019. Indigenous knowledge for resilience and adaptation in pastoral production system of Somali Regional State in Ethiopia. *Interdisciplinary Description of Complex Systems: INDECS*, 17 (4): 723-737.

Ajodo-Adebanjoko, A. 2019. Political economy and national security implications of resource-based conflicts in Nigeria. *African Security Review*, 28 (1): 56-71.

Alaimo, K. 2005. Food insecurity in the United States: An overview. *Topics in Clinical Nutrition*, 20 (4): 281-298.

Al-Amin, A.Q. and Alam, G.M. 2011. The impacts of climate change on animal health and economy: a way forward for policy option. *Asian Journal of Animal and Veterinary Advances*, 6 (11): 1061-1068.

Alemu, G.T. 2015. Land expropriation and compensation payment in Ethiopia. *Journal of Economics and sustainable development*, 6 (13): 93-97.

Alemu, M.M. and Desta, F.Y. 2017. Seasonal rainfall and crop productivity in South West Ethiopia: Preliminary analysis for recent climate. *International Journal of Water Resources and Environmental Engineering*, 9 (10): 211-217.

- Alemu, T. and Mengistu, A. 2019. Impacts of climate change on food security in Ethiopia: adaptation and mitigation options: a review. *Climate Change-Resilient Agriculture and Agroforestry: Ecosystem Services and Sustainability*: 397-412.
- Ali, M.F. and Rose, S. 2021. Farmers' perception and adaptations to climate change: Findings from three agro-ecological zones of Punjab, Pakistan. *Environmental Science and Pollution Research*, 28 (12): 14844-14853.
- Alian, S., Mayer, A., Maclean, A., Watkins, D., & Mirchi, A. 2019. Spatiotemporal dimensions of water stress accounting: Incorporating groundwater–surface water interactions and ecological thresholds. *Environmental Science & Technology*, 53 (5): 2316–2323.
- Almer, C., Laurent-Lucchetti, J., Oechslin, M. 2017. Water scarcity and rioting: Disaggregated evidence from Sub-Saharan Africa. *Journal of Environmental Economics and Management* 86: 193–209..
- Asfaw, A., Bantider, A., Simane, B. and Hassen, A. 2021. Smallholder farmers' livelihood vulnerability to climate change-induced hazards: agroecology-based comparative analysis in Northcentral Ethiopia (Woleka Sub-basin). *Heliyon*, 7 (4).
- Ashine, M.E. 2021. The adequacy of law and policy frameworks on internal displacement in Ethiopia: a critical appraisal. *National Protection of Internally Displaced Persons in Africa: Beyond the rhetoric*: 27-36.
- Assal, M.A. 2006. Sudan: Identity and conflict over natural resources. *Development*, 49 (3): 101-105.
- Awel, A.A., Lema, T.B. and Hebo, H.J. 2016. Nutritional status and associated factors among primary school adolescents of pastoral and agro-pastoral communities, Mieso Woreda, Somali Region, Ethiopia: A comparative cross-sectional study. *Journal of Public Health and Epidemiology*, 8 (11): 297-310.
- Ayele, T., Dedecha, D. and Duba, D. 2020. The impact of climate change on pastoralist livelihoods in Ethiopia: A review. *Journal of Resources Development and Management*, 63 (1-14).

- Bagath, M., Krishnan, G., Devaraj, C., Rashamol, V.P., Pragna, P., Lees, A.M. and Sejian, V. 2019. The impact of heat stress on the immune system in dairy cattle: A review. *Research in veterinary science*, 126: 94-102.
- Barrett, C.B. 2010. Measuring food insecurity. *Science*, 327 (5967): 825-828.
- Baye, T.G. 2017. Poverty, peasantry and agriculture in Ethiopia. *Annals of Agrarian Science*, 15 (3): 420-430.
- Bayu, T.B. 2021. Factors of Ethnic Conflict in the Ethiopian Federation. *Religación: Revista de Ciencias Sociales y Humanidades*, 6 (29):1.
- Bekele, S. 2017. Impacts of climate change on livestock production: A review. *Journal of Natural Sciences Research*, 7 (8): 53-59.
- Bekele, T., Getahun, M., Makebo, T. and Makebo, T. 2021. "Community level project planning (CLPP) assessment report, natural resource research directorate, Worabe, Southern Ethiopia", *Journal of Water Resources and Ocean Science*, 10 (5): 100.
- Belay, A., Recha, J.W., Woldeamanuel, T. and Morton, J.F. 2017. Smallholder farmers' adaptation to climate change and determinants of their adaptation decisions in the Central Rift Valley of Ethiopia. *Agriculture & Food Security*, 6 (1):1-13.
- Belay, K., Beyene, F. and Manig, W. 2005. Coping with drought among pastoral and agro-pastoral communities in eastern Ethiopia. *Journal of Rural Development/Nongchon-Gyeongje*, 28 (1071-2019-1825): 185-210.
- Benjaminsen, T. A. 2006. Does Climate Change Lead to Conflicts in the Sahel?, in: *The End of Desertification? : Disputing Environmental Change in the Drylands*, edited by Behnke, R., and Mortimore, M. Berlin & Heidelberg: Springer Berlin Heidelberg.
- Benjaminsen, T. A., Alinon, K., Buhaug, H., and Buseeth, J. T. 2012. Does climate change drive land-use conflicts in the Sahel? *Journal of Peace Research*, 49: 97-111.
- Berhane, A. and Tesfay, T. 2020. *Impact of El Niño and La Niña on Agriculture in Ethiopia: Implications for El Niño and La Niña Adaptation and Food Security in Ethiopia. Preprints.*

- Berhe, M., Hoag, D., Tesfay, G., Tadesse, T., Oniki, S., Kagatsume, M. and Keske, C.M. 2017. The effects of adaptation to climate change on income of households in rural Ethiopia. *Pastoralism*, 7 (1): 1-15.
- Bett, B., Kiunga, P., Gachohi, J., Sindato, C., Mbotha, D., Robinson, T., Lindahl, J. and Grace, D. 2017. Effects of climate change on the occurrence and distribution of livestock diseases. *Preventive veterinary medicine*, 137:119-129.
- Beyene, F. 2017. Natural resource conflict analysis among pastoralists in Southern Ethiopia. *Journal of Peacebuilding & Development*, 12 (1): 19-33.
- Beyene, F. 2019. Cattle Raiding and Its Implications for Food Security in Pastoral Areas of Ethiopia. *Journal of Development Studies*, 55(2): 263-278.
- Beyene, T. 2008. Measuring volatility in food grain prices and its impact on the demand for fertilizer and improved seeds in cereal production in Ethiopia. *Ethiopian Journal of Agricultural Economics*, 7 (1): 1-27.
- Bezu, A. 2020. Analyzing impacts of climate variability and changes in Ethiopia: A review. *American Journal of Modern Energy*, 6 (3): 65-76.
- Bhopal, A., Medhin, H., Bærøe, K. and Norheim, O.F. 2021. Climate change and health in Ethiopia: To what extent have the health dimensions of climate change been integrated into the Climate-Resilient Green Economy?. *World Medical & Health Policy*, 13 (2): 293-312.
- Birhan, M. and Adugna, T. 2014. Livestock feed resources assessment, constraints and improvement strategies in Ethiopia. *Middle-East Journal of Scientific Research*, 21 (4): 616-622.
- Birhane, T., Shiferaw, S., Hagos, S. and Mohindra, K.S. 2014. Urban food insecurity in the context of high food prices: a community based cross sectional study in Addis Ababa, Ethiopia. *BMC public health*, 14 (1): 1-8.
- Bogale, G.A. and Erena, Z.B. 2022. Drought vulnerability and impacts of climate change on livestock production and productivity in different agro-Ecological zones of Ethiopia. *Journal of Applied Animal Research*, 50 (1): 471-489.

Bogale, G.A. and Temesgen, T. 2021. Impacts and challenges of seasonal variabilities of El Niño and La Niña on crop and livestock production in the central rift valley of Ethiopia: a review. *Environment Pollution and Climate Change*, 5 (199): 2.

Breisinger C., Ecker O. , Trinh Tan J.-F. 2015. Conflict and food security: How do we break the links? 2014–2015 global food policy report, Chapter 7

Breyer, B., Zipper, S. C., & Qiu, J. 2018. Sociohydrological impacts of water conservation under anthropogenic drought in Austin, TX(USA): Sociohydro impacts of water conservation. *Water Resources Research*, 54 (4): 3062–3080.

Brottem, Leif and Andrew McDonnell. 2020. Pastoralism and Conflict in the Sudano-Sahel: A Review of the Literature, 1st ed. Washington DC: Search for Common Ground.

Bruzelius, C. 2022. Local government responses to EU citizens' integration needs. *Journal of Ethnic and Migration Studies*, 48 (9): 2187-2205.

Brzoska, M. and Fröhlich, C. 2016. Climate change, migration and violent conflict: vulnerabilities, pathways and adaptation strategies. *Migration and Development*, 5 (2): 190-210.

Buhaug, H. 2015. Climate–conflict research: some reflections on the way forward. *Wiley Interdisciplinary Reviews: Climate Change*, 6 (3): 269-275.

Buhaug, H. 2016. Climate change and conflict: taking stock. *Peace Economics, Peace Science and Public Policy*, 22 (4): 331-338.

Burka, B.M., Roro, A.G. and Regasa, D.T. 2023. Dynamics of pastoral conflicts in eastern Rift Valley of Ethiopia: Contested boundaries, state projects and small arms. *Pastoralism*, 13 (1): 5.

Burke, M., Hsiang, S. M., & Miguel, E. 2015. Climate and conflict. *Annual Review of Economics*, 7: 577–617.

Burke, M., Hsiang, S.M. and Miguel, E. 2015. Global non-linear effect of temperature on economic production. *Nature*, 527 (7577): 235-239.

Cappelli, F., Conigliani, C., Consoli, D., Costantini, V. and Paglialunga, E. 2023. Climate change and armed conflicts in Africa: Temporal persistence, non-linear climate impact and geographical spillovers. *Economia Politica*, 40 (2): 517-560.

Catley, A. and Iyasu, A. 2010. Moving up or moving out? A rapid livelihoods and conflict analysis in Mieso-Mulu woreda, Shinile Zone, Somali Region, Ethiopia. *Tufts University, Boston*.

Central statistical Agency (CSA). 2007. The federal democratic republic of Ethiopia central statistical agency, agricultural sample survey 2006/2007 (1999 E.C.), volume I, report on area and production of major crops (private peasant holdings, meher season) statistical bulletin 588. Addis Ababa, Ethiopia.

Change, I.P.O.C. 2007. Climate change 2007: The physical science basis. *Agenda*, 6 (07): 333.

Cheng, M., McCarl, B. and Fei, C. 2022. Climate change and livestock production: a literature review. *Atmosphere*, 13 (1): 140.

Chinasho, A., Yaya, D. and Tessema, S. 2017. The adaptation and mitigation strategies for climate change in pastoral communities of Ethiopia. *American Journal of Environmental Protection*, 6 (3): 69.

Clarke, B., Otto, F., Stuart-Smith, R. and Harrington, L. 2022. Extreme weather impacts of climate change: an attribution perspective. *Environmental Research: Climate*, 1 (1): 012001.

CNA Corp. 2007. National security and the threat of climate change. Rep. CNA Corp., Arlington, VA. https://www.cna.org/cna_files/pdf/national%20security%20and%20the%20threat%20of%20climate%20change.pdf

Collier, P., Conway, G. and Venables, T. 2008. Climate change and Africa. *Oxford review of economic policy*, 24 (2): 337-353.

Collier, R.J., Baumgard, L.H., Zimbelman, R.B. and Xiao, Y. 2019. Heat stress: physiology of acclimation and adaptation. *Animal Frontiers*, 9 (1): 12-19.

- Coltorti, M., Firuzabadi, D., Borri, A., Fantozzi, P. and Pieruccini, P. 2015. Planation surfaces and the long-term geomorphological evolution of Ethiopia. *Landscapes and landforms of Ethiopia*, 117-136.
- Conway, D. and Schipper, E.L.F. 2011. Adaptation to climate change in Africa: Challenges and opportunities identified from Ethiopia. *Global environmental change*, 21 (1): 227-237.
- Cook, B.I., Mankin, J.S. and Anchukaitis, K.J. 2018. Climate change and drought: From past to future. *Current Climate Change Reports*, 4 (1): 164-179.
- Cousins, B. 2007. More than socially embedded: The distinctive character of 'communal tenure' regimes in South Africa and its implications for land policy. *Journal of Agrarian Change*, 7(3): 281-315.
- Couttenier, M. and Soubeyran, R. 2014. Drought and civil war in sub-saharan africa. *The Economic Journal*, 124 (575): 201-244.
- Dago, E. 2021. Armed conflicts and food insecurity - a short literature review. Montpellier (France): INRAe/CIRAD/Alliance of Bioversity International and CIAT. 14 p
- Dahal, D.S. 2011. *Impact of climate change on livelihood and biodiversity in rural communities: a case study of Siddhiganesh and Nepane community forestry user groups of Sindhupalchwok district of Nepal* (Doctoral dissertation, Central Department of Rural Development Tribhuvan University, Kathmandu).
- Dalby, S. 2016. Climate Change and the Insecurity Frame. In S. O'lear & S. Dalby (Eds.), *Reframing Climate Change: Constructing Ecological Geopolitics* (Routledge, pp. 83–99). London and New York: Routledge.
- Davies, J., Herrera, P., Ruiz-Mirazo, J., Mohamed-Katerere, J., Hannam, I., Nuesiri, E. 2016. Improving governance of pastoral lands: Implementing the Voluntary.
- Delgado, C., Murugani, V. and Tschunkert, K. 2021. Food Systems in Conflict and Peacebuilding Settings: Pathways and Interconnections. SIPRI Policy Brief

Delgado, C., Tshunkert, K. and Smith, D., 2023. SIPRI Research Policy Paper-FOOD INSECURITY IN AFRICA: DRIVERS AND SOLUTIONS.

Demeke, A.B., Keil, A. and Zeller, M. 2011. Using panel data to estimate the effect of rainfall shocks on smallholders food security and vulnerability in rural Ethiopia. *Climatic change*, 108 (1-2): 185-206.

Demem, M.S. 2023. Impact and adaptation of climate variability and change on smallholders and agriculture in Ethiopia: A review. *Heliyon*.

Dercon, S. and Christiaensen, L. 2011. Consumption risk, technology adoption and poverty traps: Evidence from Ethiopia. *Journal of development economics*, 96 (2): 159-173.

Dercon, S., Hoddinott, J. and Woldehanna, T. 2012. Growth and chronic poverty: Evidence from rural communities in Ethiopia. *Journal of Development Studies*, 48 (2): 238-253.

Dereje, M. 2018. Resource-Based Conflicts and Food Security among Ethiopian Pastoralists. *African Journal on Conflict Resolution*, 18(1): 57-74.

Desalegn, K., 2016. The climate change impacts on livestock production: A Review. *Global Veterinaria*, 16 (2): 206-212.

Destrijcker, L., Yishak, M., Thomson, M., Traore, A., Xu, Y.A. and Kurnoth, H. 2023. Climate, Peace and Security Study: Somali Region, Ethiopia.

Devereux, S. 2006. *Vulnerable livelihoods in Somali region, Ethiopia*. Brighton: Institute of Development Studies.

Devonald, M., Jones, N., Iyasu Gebru, A. and Yadete, W. 2022. Rethinking climate change through a gender and adolescent lens in Ethiopia. *Climate and Development*, 1-11.

Di Baldassarre, G., Wanders, N., AghaKouchak, A., Kuil, L., Rangecroft, S., Veldkamp, T. I. E. 2018. Water shortages worsened by reservoir effects. *Nature Sustainability*, 1 (11): 617–622.

- Di Falco, S., Veronesi, M. and Yesuf, M. 2011. Does adaptation to climate change provide food security? A micro-perspective from Ethiopia. *American journal of agricultural economics*, 93 (3): 829-846.
- Doney, S.C., Balch, W.M., Fabry, V.J. and Feely, R.A. 2009. Ocean acidification: a critical emerging problem for the ocean sciences. *Oceanography*, 22 (4): 16-25.
- Duflo, E. 2012. Women empowerment and economic development. *Journal of Economic literature*, 50 (4): 1051-1079.
- Edossa, D.C., Babel, M.S. and Das Gupta, A. 2010. Drought analysis in the Awash river basin, Ethiopia. *Water resources management*, 24 (1): 1441-1460.
- Elhadi, A.Y., Nyariki, D.M., Wasonga, V.O. and Ekaya, W.N. 2012. Factors influencing transient poverty among agro-pastoralists in semi-arid areas of Kenya. *African Crop Science Journal*, 20(1).
- Ember, C.R., Skoggard, I., Adem, T.A. and Faas, A.J. 2014. Rain and raids revisited: disaggregating ethnic group livestock raiding in the Ethiopian-Kenyan border region. *Civil Wars*, 16 (3): 300-327.
- Emiru, N.C., Recha, J.W., Thompson, J.R., Belay, A., Aynekulu, E., Manyevere, A., Demissie, T.D., Osano, P.M., Hussein, J., Molla, M.B. and Mengistu, G.M. 2022. Impact of climate change on the hydrology of the Upper Awash River Basin, Ethiopia. *Hydrology*, 9 (1): 3.
- Esayas, B., Simane, B., Teferi, E., Ongoma, V. and Tefera, N. 2018. Trends in extreme climate events over three agroecological zones of southern Ethiopia. *Advances in Meteorology*, 1-17.
- Escarcha, J.F., Lassa, J.A. and Zander, K.K. 2018. Livestock under climate change: a systematic review of impacts and adaptation. *Climate*, 6 (3): 54.
- Ethiopian Peace Observatory. 2023. Conflict in East and West Hararge. Internet: <https://epo.acleddata.com/east-west-hararge-conflict/>. Access: 11 September 2023

Ewbank, R., Perez, C., Cornish, H., Worku, M. and Woldetsadik, S. 2019. Building resilience to El Niño-related drought: experiences in early warning and early action from Nicaragua and Ethiopia. *Disasters*, 43: 345-S367.

FAO (Food and Agriculture Organization). 2018. Livestock production systems spotlight cattle sectors in Ethiopia. Africa Sustainable Livestock, 2050. © FAO, 2018 I8271EN/1/01.18.

FAO (Food and Agriculture Organization). 2020. The state of food security and nutrition in the world 2020 FAO, IFAD, UNICEF, WFP and WHO (<https://doi.org/10.4060/ca9692en>)

FAO (Food and Agriculture Organization). 2021. Boosting smallholder resilience for recovery: Safeguard vulnerable pastoralist and agro-pastoralist households in East and West Africa and the Sahel. Accra: FAO COVID-19 Response and Recovery Programme. <https://doi.org/10.4060/cb3768en>.

FAO, Un World Food Program (WFP). 2010. The state of food insecurity in the world 2010– addressing food insecurity in protracted crises.

Fawzy, S., Osman, A.I., Doran, J. and Rooney, D.W. 2020. Strategies for mitigation of climate change: a review. *Environmental Chemistry Letters*, 18: 2069-2094.

Fjelde, H., & von Uexkull, N. 2012. Climate triggers: Rainfall anomalies, vulnerability and communal conflict in Sub-Saharan Africa. *Political Geography*, 31:444–453.

Flintan, F. and Tamrat, I. 2002. Spilling blood over water? The case of Ethiopia. *Scarcity and Surfeit: The Ecology of Africa's Conflicts. ISS, Pretoria, South Africa*. 243-319.

Flood, J. 2010. The importance of plant health to food security. *Food Sec.* 2, 215–231.

Forman, S., Hungerford, N., Yamakawa, M., Yanase, T., Tsai, H.J., Joo, Y.S., Yang, D.K. and Nha, J.J. 2008. Climate change impacts and risks for animal health in Asia. *Rev Sci Tech Off Int Epiz*, 27 (2): 581-97.

Fratkin, E. 2014. Ethiopia's pastoralist policies: development, displacement and resettlement. *Nomadic Peoples*, 18 (1): 94-114.

Fratkin, E. 2014. Ethiopia's pastoralist policies: development, displacement and resettlement. *Nomadic Peoples*, 18 (1): 94-114.

Funk, C., Pedreros, D., Nicholson, S., Hoell, A., Korecha, D., Galu, G., Artan, G., Segele, Z., Tadege, A., Atheru, Z. and Teshome, F. 2019. Examining the potential contributions of extreme “Western V” sea surface temperatures to the 2017 March–June East African Drought. *Bulletin of the American Meteorological Society*, 100 (1): 55-60.

Funk, C.C. 2012. Exceptional warming in the western Pacific-Indian Ocean warm pool has contributed to more frequent droughts in eastern Africa. *Bulletin of the American Meteorological Society*, 93:1049-1051.

Gakuria, A.R. 2013. *Natural resource based conflict among pastoralist communities in Kenya* (Doctoral dissertation, University of Nairobi).

Galmessa, U., Dessalegn, J., Tola, A., Prasad, S. and Kebede, L.M. 2013. Dairy production potential and challenges in western Oromia milk value chain, Oromia, Ethiopia. *Journal of Agriculture and Sustainability*, 2(1).

Garnett, T. 2009. Livestock-related greenhouse gas emissions: impacts and options for policy makers. *Environmental science & policy*, 12 (4): 491-503.

Gashaw, T., Asresie, A. and Haylom, M. 2014. Climate change and livestock production in Ethiopia. *Adv Life Sci Technol*, 22: 39-42.

Gautier, D., Denis, D. and Locatelli, B. 2016. Impacts of drought and responses of rural populations in West Africa: a systematic review. *Wiley Interdisciplinary Reviews: Climate Change*, 7 (5): 666-681.

Gavin, M. Conflict in Ethiopia. 2021. Available online: <https://cfr.org/global-conflict-tracker/conflict/conflict-ethiopia>

Gebbisa, M.B. and Mulatu, G. 2020. Choice of Livelihood Strategies and Its Determinants in Pastoralist Area of Bale Zone: The Case of Sawena District, Oromia, South East Ethiopia. *Open Access Library Journal*, 7 (9): 1-22.

Gebeye, B.A. 2016. Unsustain the sustainable: An evaluation of the legal and policy interventions for pastoral development in Ethiopia. *Pastoralism*, 6:1-14.

Gebisa, S. 2018. Factors influencing the pastoralists' livestock income. The case of Yabello district of Borana Zone in Ethiopia's regional state Oromiya. Master's Thesis, 2018, 150 Pages, Dilla University, Ethiopia

Gebre, A. 2021. Land Use Changes and Conflict between Pastoralists and Farmers in Ethiopia. *Land Use Policy*, 109, 105659.

Gebrechorkos, S.H., Hülsmann, S. and Bernhofer, C. 2019. Long-term trends in rainfall and temperature using high-resolution climate datasets in East Africa. *Scientific reports*, 9 (1): 11376.

Gebrechorkos, S.H., Hülsmann, S. and Bernhofer, C. 2019. Regional climate projections for impact assessment studies in East Africa. *Environmental Research Letters*, 14 (4): 044031

Gebrehiwot, T., Van der Veen, A. and Maathuis, B. 2011. Spatial and temporal assessment of drought in the Northern highlands of Ethiopia. *International Journal of Applied Earth Observation and Geoinformation*, 13 (3): 309-321.

Gebremeskel, E.N., Desta, S. and Kassa, G.K. 2019. Pastoral Development in Ethiopia: Trends and the way forward. Development Knowledge and Learning. 609 World Bank, Washington, DC

Gelan, D.T., Getahun, T. and Beyene, F. 2017. Participatory conflict analysis: the case of pastoralist groups in South Eastern Ethiopia. *Res Humanit Soc Sci*, 7:39-55.

Gemenne, F., Barnett, J., Adger, W.N. and Dabelko, G.D. 2014. Climate and security: evidence, emerging risks, and a new agenda. *Climatic Change*, 123:1-9.

Gena, A.M. and Jarra, K.I. 2023. An appraisal of the practice of indigenous conflict resolution mechanisms in building a culture of peace in Bale zones, Oromia National Regional State, Ethiopia. *Heliyon*, 9(4).

Gethings, O.J., Rose, H., Mitchell, S., Van Dijk, J. and Morgan, E.R. 2015. Asynchrony in host and parasite phenology may decrease disease risk in livestock under climate warming: *Nematodirus battus* in lambs as a case study. *Parasitology*, 142 (10): 1306-1317.

Gezie, M. 2019. “Farmer’s response to climate change and variability in Ethiopia: a review”, *Cogent Food and Agriculture*, 5(1).

Ghahramani, A., Howden, S.M., del Prado, A., Thomas, D.T., Moore, A.D., Ji, B. and Ates, S. 2019. Climate change impact, adaptation, and mitigation in temperate grazing systems: a review. *Sustainability*, 11 (24): 7224.

Ginbo, T. 2022. Heterogeneous impacts of climate change on crop yields across altitudes in Ethiopia. *Climatic Change*, 170 (1-2): 12.

Giovetti, O. 2022. Climate change in Ethiopia: What happened in 2021, and what’s the forecast for 2022?, 11 February 2022. Internet: <https://www.concern.net/news/climate-change-in-ethiopia>. Access: 4 January 2023

Giridhar, K. and Samireddypalle, A. 2015. Impact of climate change on forage availability for livestock. *Climate change impact on livestock: adaptation and mitigation*, 97-112.

Girmay, F.D., Gebreselassie, G. and Bajigo, A. 2018. Climate change risk management and coping strategies for sustainable camel production in the case of Somali Region, Ethiopia. *Journal of Biotechnology Research*, 4 (9): 66-75.

Gizelis, T. I., & Wooden, A. E. 2010. Water resources, institutions, & intrastate conflict. *Political Geography*, 29 (8): 444–453.

Godde, C.M., Mason-D’Croz, D., Mayberry, D.E., Thornton, P.K. and Herrero, M. 2021. Impacts of climate change on the livestock food supply chain; a review of the evidence. *Global food security*, 28: 00488.

Grant, M.J. and Booth, A. 2009. A typology of reviews: an analysis of 14 review types and associated methodologies. *Health information & libraries journal*, 26 (2): 91-108.

Gundersen, C., & Ziliak, J. P. 2014. Childhood Food Insecurity in the U.S.: Trends, Causes, and Policy Options. *The Future of Children*, 24 (2): 1–18.

Gurmessa, B. and Mekuriaw, A. 2019. What determines the operational sustainability of rural drinking water points in Ethiopia? The case of Woliso woreda. *Journal of Water, Sanitation and Hygiene for Development*, 9 (4): 743-753.

Habte, M., Eshetu, M., Maryo, M., Andualem, D. and Legesse, A. 2022. Effects of climate variability on livestock productivity and pastoralists perception: The case of drought resilience in Southeastern Ethiopia. *Veterinary and Animal Science*, 16: 100240.

Habte, M., Eshetu, M., Maryo, M., Andualem, D. and Legesse, A. 2022. Effects of climate variability on livestock productivity and pastoralists perception: The case of drought resilience in Southeastern Ethiopia. *Veterinary and Animal Science*, 16: 100240.

Hagmann, T. 2014. Punishing the periphery: legacies of state repression in the Ethiopian Ogaden. *Journal of Eastern African Studies*, 8 (4): 725-739.

Hagmann, T. 2020. Fast politics, slow justice: Ethiopia's Somali region two years after Abdi Iley. *Conflict Research Programme Briefing Paper*. London: LSE (<https://www.lse.ac.uk/ideas/Assets/Documents/Conflict-Research-Programme/crp-memos/Hagmann-Two-years-after-Iley-final.pdf>, 2021 年 10 月 15 日アクセス).

Hagmann, T. and Mulugeta, A. 2008. Pastoral conflicts and state-building in the Ethiopian lowlands. *Africa Spectrum*, (1): 19-37.

Haile, G.G., Tang, Q., Sun, S., Huang, Z., Zhang, X. and Liu, X. 2019. Droughts in East Africa: Causes, impacts and resilience. *Earth-science reviews*, 193: 146-161.

Hardiman, S.C., Dunstone, N.J., Scaife, A.A., Smith, D.M., Ineson, S., Lim, J. and Fereday, D. 2019. The impact of strong El Niño and La Niña events on the North Atlantic. *Geophysical Research Letters*, 46 (5): 2874-2883.

Hassan, A.B. 2020. Causes of conflict and the role of indigenous conflict resolution mechanism among degodia clan: in case of Dollo Addo district, Somali region, south east Ethiopia. *American journal of applied psychology*, 9 (4): 117-117.

Hauge, W., Ellingsen, T. 1998. Beyond Environmental Scarcity: Causal Pathways to Conflict. *Journal of Peace Research* 35: 299–317.

Headey, D., Taffesse, A.S. and You, L. 2014. Diversification and development in pastoralist Ethiopia. *World Development*, 56: 200-213.

Hegazi, F., Murugani, V., Pacillo, G. and Läderach, P. 2022. The World Food Programme's Contribution to Improving the Prospects for Peace in Ethiopia. Stockholm International Peace Research Institute. Sweden.

Hegre, H., Buhaug, H., Calvin, K.V., Nordkvelle, J., Waldhoff, S.T. and Gilmore, E. 2016. Forecasting civil conflict along the shared socioeconomic pathways. *Environmental Research Letters*, 11 (5): 054002.

Hendrix, C.S. and Salehyan, I. 2012. Climate change, rainfall, and social conflict in Africa. *Journal of peace research*, 49 (1): 35-50.

Hidoso, D. and Guyo, M. 2017. Climate change effects on livestock feed resources: A review. *Journal of Fisheries & Livestock Production*, 5: 259.

Hoell, A., Hoerling, M., Eischeid, J., Quan, X.W. and Liebmann, B. 2017. Reconciling theories for human and natural attribution of recent East Africa drying. *Journal of Climate*, 30 (6): 1939-1957.

Homer-Dixon, T. 1999. *Environment, Scarcity, and Violence*. Princeton: Princeton University Press.

Homer-Dixon, T.F. 1994. Environmental scarcities and violent conflict: evidence from cases. *International security*, 19 (1): 5-40.

Hopkins, A. and Del Prado, A. 2007. Implications of climate change for grassland in Europe: impacts, adaptations and mitigation options: a review. *Grass and Forage Science*, 62 (2): 118-126.

Hristov, A.N., Degaetano, A.T., Rotz, C.A., Hoberg, E., Skinner, R.H., Felix, T., Li, H., Patterson, P.H., Roth, G., Hall, M. and Ott, T.L. 2018. Climate change effects on livestock in the Northeast US and strategies for adaptation. *Climatic Change*, 146: 33-45.

Hsiang, S. 2016. Climate Econometrics. *Annual Review of Resource Economics*, 8: 43–75.

Hsiang, S. M., Meng, K. C., & Cane, M. A. 2011. Civil conflicts are associated with the global climate. *Nature*, 476 (7361): 438–441.

Human Rights Watch. Ethiopia: Events of 2020. 2020. Available online: <https://www.hrw.org/world-report/2021/countrychapters/ethiopia> Access: 5 August 2023

Hundie, B. 2010. Conflicts between Afar pastoralists and their neighbors: Triggers and motivations. *International Journal of Conflict and Violence (IJCV)*, 4 (1): 134-148.

Hussein, K., Sumberg, J. and Seddon, D. 1999. Increasing violent conflict between herders and farmers in Africa: claims and evidence. *Development Policy Review* 17 (4): 397-418.

Hussein, M. 2022. *Inter-Clan Conflicts In the Somali Region of Ethiopia: A Case Study Of the Conflicts between the Dagodia and Baydisle Clans* (Doctoral dissertation).

Ide, T. 2017. Research methods for exploring the links between climate change and conflict. *Wiley Interdisciplinary Reviews: Climate Change*, 8 (3): 456

Ide, T. 2019. The impact of environmental cooperation on peacemaking: Definitions, mechanisms, and empirical evidence. *International Studies Review*, 21 (3): 327-346.

Ide, T., Brzoska, M., Donges, J.F. and Schleussner, C.F. 2020. Multi-method evidence for when and how climate-related disasters contribute to armed conflict risk. *Global Environmental Change*, 62: 102063.

Ide, T., Schilling, J., Link, J.S., Scheffran, J., Ngaruiya, G. and Weinzierl, T. 2014. On exposure, vulnerability and violence: spatial distribution of risk factors for climate change and violent conflict across Kenya and Uganda. *Political Geography*, 43: 68-81.

Index, G.G.H. and by Severity, G.H. 2021. *Concern Worldwide and Welthungerhilfe. New York, NY: GHI.*

IPC. 2020. Ethiopia IPC Acute Food Insecurity Analysis, October 2020–September 2021. Internet: <https://reliefweb.int/report/ethiopia/ethiopia-ipc-acute-foodinsecurity-analysis-october-2020-september-2021-issued>. Access: 8 June 2023

IPCC. 2019. *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and*

greenhouse gas fluxes in terrestrial ecosystems [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)]. In press.

IPCC. 2021. Climate Change 2021: The Physical Science Basis. <https://www.ipcc.ch/report/ar6/wg1/>. Access: 24 September 2023

Ismail, M. 2019. The Problem of Property Rights to Land Acquisition of State (Jurisprudence and Conditions in Land National Law). *Budapest International Research and Critics Institute-Journal (BIRCI-Journal)*, 2 (3): 68-77.

Joshi, S., Jasra, W.A., Ismail, M., Shrestha, R.M., Yi, S.L. and Wu, N. 2013. Herders' perceptions of and responses to climate change in Northern Pakistan. *Environmental management*, 52: 639-648.

Jun, T. 2017. Temperature, maize yield, and civil conflicts in sub-Saharan Africa. *Climatic Change*, 142: 183-197.

Kadzere, C.T., Murphy, M.R., Silanikove, N. and Maltz, E. 2002. Heat stress in lactating dairy cows: a review. *Livestock production science*, 77 (1): 59-91.

Kassahun, A. 2020. Climate Change, Food Insecurity, and Conflict among Borana Pastoralists in Ethiopia. *Environmental Development*, 34, 100512.

Kassegn, A. and Endris, E. 2021. Review on socio-economic impacts of 'Triple Threats' of COVID-19, desert locusts, and floods in East Africa: Evidence from Ethiopia. *Cogent Social Sciences*, 7 (1): 1885122.

Kassie, A., Cheru, T., Sishaw, T. and Bogale, W. 2023. Understanding administrative boundary related conflicts and their challenges in Ethiopia since 1991. *Cogent Social Sciences*, 9 (2): 2249306.

Kefale, A. 2013. *Federalism and ethnic conflict in Ethiopia: A comparative regional study*. Routledge.

- Kefyalew, A. and Tegegn, F. 2012. The effect of climate change on ruminant livestock population dynamics in Ethiopia. *Livestock Research for Rural Development*, 24 (10).
- Keller, E.J. 1992. Drought, war, and the politics of famine in Ethiopia and Eritrea. *The Journal of Modern African Studies*, 30 (4): 609-624.
- Kelley, C.P., Mohtadi, S., Cane, M.A., Seager, R., Kushnir, Y. 2015. Climate change in the Fertile Crescent and implications of the recent Syrian drought. *Proc. Natl. Acad. Sci. U. S. A.* 112, 3241–3246. <https://doi.org/10.1073/pnas.1421533112>.
- Kenee, F. 2022. Pastoralists and Violent Conflict along the Oromia–Somali Border in Eastern Ethiopia: Institutional Options toward Peacebuilding. *African Studies Review*, 65 (2): 404-429.
- Kew, S.F., Philip, S.Y., Hauser, M., Hobbins, M., Wanders, N., Van Oldenborgh, G.J., Van Der Wiel, K., Veldkamp, T.I., Kimutai, J., Funk, C. and Otto, F.E. 2021. Impact of precipitation and increasing temperatures on drought trends in eastern Africa.
- Khan, I., Mesalam, A., Heo, Y.S., Lee, S.H., Nabi, G. and Kong, I.K. 2023. Heat Stress as a Barrier to Successful Reproduction and Potential Alleviation Strategies in Cattle. *Animals*, 13 (14): 2359.
- Khan, N., Ma, J., Zhang, H. and Zhang, S. 2023. Climate Change Impact on Sustainable Agricultural Growth: Insights from Rural Areas. *Atmosphere*, 14 (8): 1194.
- Kiger, M.E. and Varpio, L. 2020. Thematic analysis of qualitative data: AMEE Guide No. 131. *Medical teacher*, 42 (8): 846-854.
- Klomp, J. and Bulte, E. 2013. Climate change, weather shocks, and violent conflict: A critical look at the evidence. *Agricultural Economics*, 44 (1): 63-78.
- Kotir, J.H. 2011. Climate change and variability in Sub-Saharan Africa: a review of current and future trends and impacts on agriculture and food security. *Environment, Development and Sustainability*, 13: 587-605.
- Koubi, V. 2019. Climate change and conflict. *Annual Review of Political Science*, 22:343-360.

- Koubi, V., Bernauer, T., Kalbhenn, A. and Spilker, G. 2012. Climate variability, economic growth, and civil conflict. *Journal of peace research*, 49 (1): 113-127.
- Kourouma, J.M., Eze, E., Kelem, G., Negash, E., Phiri, D., Vinya, R., Girma, A. and Zenebe, A. 2022. Spatiotemporal climate variability and meteorological drought characterization in Ethiopia. *Geomatics, Natural Hazards and Risk*, 13 (1): 2049-2085.
- Kuczynski, T., Blanes-Vidal, V., Li, B., Gates, R.S., de Alencar Naas, I., Moura, D.J., Berckmans, D. and Banhazi, T.M. 2011. Impact of global climate change on the health, welfare and productivity of intensively housed livestock. *International Journal of Agricultural and Biological Engineering*, 4 (2): 1-22.
- Kumar, B.G. 1990. Ethiopian famines 1973-1985: A case study. *The Political Economy of Hunger Volume 2 Famine Prevention*, 1 (2): 173-216.
- Kumar, B.G. 1990. Ethiopian famines 1973-1985: A case study. *The Political Economy of Hunger Volume 2 Famine Prevention*, 173-216.
- Kumar, N. and Quisumbing, A. 2012. Inheritance practices and gender differences in poverty and well-being in rural Ethiopia. *Development Policy Review*, 30 (5): 573-595.
- Lautze, S., Raven-Roberts, A. and Erkinch, T. 2009. Humanitarian governance in the new millennium: an Ethiopian case study. *Group HP. London: Overseas Development Institute*, 38.
- Legese, W., Koricha, D. and Ture, K. 2018. Characteristics of seasonal rainfall and its distribution over Bale Highland, Southeastern Ethiopia. *Journal of Earth Science & Climatic Change*, 9(2).
- Leister, A.M., Paarlberg, P.L. and Lee, J.G. 2015. Dynamic effects of drought on US crop and livestock sectors. *Journal of Agricultural and Applied Economics*, 47 (2): 261-284.
- Lewis, K. 2017. Understanding climate as a driver of food insecurity in Ethiopia. *Climatic Change*, 144: 317-328.
- Li, Y., Ye, W., Wang, M. and Yan, X. 2009. Climate change and drought: a risk assessment of crop-yield impacts. *Climate research*, 39 (1): 31-46.

Lie, J.H.S. and Mesfin, B. 2018. Ethiopia: A political economy analysis. *Norwegian Institute of International Affairs, Norway.*

Lind, J., Sabates-Wheeler, R., Kohnstamm, S., Caravani, M., Eid, A., Nightingale, D.M. and Oringa, C. 2016. Changes in the drylands of eastern Africa: case studies of pastoralist systems in the region. *Nairobi: DFID East Africa Research Hub.*

Lind, J., Sabates-Wheeler, R., Kohnstamm, S., Caravani, M., Eid, A., Manzolillo Nightingale, D. and Oringa, C. 2016. Changes in the drylands of Eastern Africa: implications for resilience-strengthening efforts. Brighton: Institute of Development Studies

Lioubimtseva, E. and Henebry, G.M. 2009. Climate and environmental change in arid Central Asia: Impacts, vulnerability, and adaptations. *Journal of Arid Environments*, 73 (11): 963-977.

Loopstra, R., & Tarasuk, V. 2013. The Relationship between Food Banks and Food Insecurity: Insights from Canada. *Social Science & Medicine*, 94: 11–19.

Loopstra, R., Reeves, A., McKee, M., and Stuckler, D. 2015. Food Insecurity and Social Protection in Europe: Quasi-Natural Experiment of Europe's Great Recession. *Public Health Nutrition*, 18 (16): 2890–2897.

Lubroth, J. 2012. Climate change and animal health. *FAO: Building resilience for adaptation to climate change in the agriculture sector. Roma*, 63-70.

Lumborg, S., Tefera, S., Munslow, B. and Mor, S.M. 2021. Examining local perspectives on the influence of climate change on the health of Hamer pastoralists and their livestock in Ethiopia. *Pastoralism*, 11 (1):1-17.

Lunt, I.D., Jansen, A. and Binns, D.L. 2012. Effects of flood timing and livestock grazing on exotic annual plants in riverine floodplains. *Journal of Applied Ecology*, 49 (5): 1131-1139.

Madurga-Lopez, I.M., Gupta, T.D., Carneiro, B., Liebig, T., Läderach, P. and Pacillo, G. 2022. How does climate exacerbate root causes of conflict in Ethiopia: An impact pathway analysis. *Climate Security Observatory Series.*

Magrath, J. 2015. *Entering Uncharted Waters: El Niño and the threat to food security*. Oxfam International.

Magsi, H. and Torre, A. 2013. Approaches to understand land use conflicts in the developing countries. *The Macrotheme Review*, 2 (1): 119-136.

Majid, N., Abdirahman, K. and Sheikh Daar, A. 2022. Ethiopia's Somali region: between drought and unrest. *Conflict Research Programme Blog*.

Malhi, G.S., Kaur, M. and Kaushik, P. 2021. Impact of climate change on agriculture and its mitigation strategies: A review. *Sustainability*, 13 (3): 1318.

Marengo, J.A., Cunha, A.P., Cuartas, L.A., Deusdará Leal, K.R., Broedel, E., Seluchi, M.E., Michelin, C.M., De Praga Baião, C.F., Chuchón Angulo, E., Almeida, E.K. and Kazmierczak, M.L. 2021. Extreme drought in the Brazilian Pantanal in 2019–2020: characterization, causes, and impacts. *Frontiers in Water*, 3: 639204.

Markakis, J. 2003. Anatomy of a Conflict: Afar & Ise Ethiopia. *Review of African Political Economy*, 30 (97): 445-453.

Markakis, J. 2011. *Ethiopia: The last two frontiers* (Vol. 10). Boydell & Brewer Ltd.

Martin, R., Mueller, B., Linstädter, A. and Frank, K. 2014. How much climate change can pastoral livelihoods tolerate? Modelling rangeland use and evaluating risk. *Global Environmental Change*, 24: 183-192.

Martin-Shields, C.P. and Stojetz, W. 2019. Food security and conflict: Empirical challenges and future opportunities for research and policy making on food security and conflict. *World development*, 119:150-164.

Maystadt, J.F., Calderone, M. and You, L. 2014. Local warming and violent conflict in North and South Sudan. *Journal of Economic Geography*, 15 (3): 649-671.

McDowell, G., Ford, J. and Jones, J. 2016. Community-level climate change vulnerability research: trends, progress, and future directions. *Environmental Research Letters*, 11 (3): 033001.

McGuirk, E.F. and Nunn, N. 2020. *Nomadic pastoralism, climate change, and conflict in Africa*. Cambridge, MA: National Bureau of Economic Research.

- Megerssa, G.R. and Bekere, Y.B. 2019. Causes, consequences and coping strategies of land degradation: evidence from Ethiopia. *Journal of Degraded and Mining Lands Management*, 7 (1): 1953.
- Meier, P., Bond, D. and Bond, J. 2007. Environmental influences on pastoral conflict in the Horn of Africa. *Political Geography*, 26 (6): 716-735.
- Mekonen, A.A. and Berlie, A.B. 2021. Rural households' livelihood vulnerability to climate variability and extremes: A livelihood zone-based approach in the Northeastern Highlands of Ethiopia. *Ecological Processes*, 10:1-23.
- Mekonnen, A., Tessema, A., Ganewo, Z. and Haile, A. 2021. Climate change impacts on household food security and adaptation strategies in southern Ethiopia. *Food and Energy Security*, 10 (1): 266.
- Mekuyie, M. and Mulu, D. 2021. Perception of impacts of climate variability on pastoralists and their adaptation/coping strategies in fentale district of Oromia region, Ethiopia. *Environmental Systems Research*, 10:1-10.
- Mekuyie, M. and Mulu, D. 2021. Perception of impacts of climate variability on pastoralists and their adaptation/coping strategies in fentale district of Oromia region, Ethiopia. *Environmental Systems Research*, 10: 1-10.
- Mekuyie, M., Jordaan, A. and Melka, Y. 2018. Understanding resilience of pastoralists to climate change and variability in the Southern Afar Region, Ethiopia. *Climate Risk Management*, 20: 64-77.
- Mendelsohn, R.O. and Dinar, A. 2009. *Climate change and agriculture: an economic analysis of global impacts, adaptation and distributional effects*. Edward Elgar Publishing.
- Mera, G.A. 2018. Drought and its impacts in Ethiopia. *Weather and climate extremes*, 22: 24-35.
- Mersha, A.A. and van Laerhoven, F. 2018. The interplay between planned and autonomous adaptation in response to climate change: Insights from rural Ethiopia. *World Development*, 107: 87-97.

Messay, M.T. 2020. Crisis and Fragility: Economic Impact of COVID-19 and Policy Responses. *KIEP Visiting Scholars' Opinion Paper*, 357-367.

Messer, E. 2009. Rising food prices, social mobilizations, and violence: conceptual issues in understanding and responding to the connections linking hunger and conflict. *Napa Bulletin*, 32 (1): 2-22.

Meze-Hausken, E. 2004. Contrasting climate variability and meteorological drought with perceived drought and climate change in northern Ethiopia. *Climate research*, 27 (1): 9-31.

Miccoli, S., Finucci, F. and Murro, R. 2016. Feeding the cities through urban agriculture the community esteem value. *Agriculture and Agricultural Science Procedia*, 8: 128-134.

Michael, Y.G., Hadgu, K. and Ambaye, Z. 2005. Addressing pastoralist conflict in Ethiopia: The case of the Kuraz and Hamer sub-districts of South Omo zone.

Mildner, S.A., Lauster, G. and Wodni, W. 2011. Scarcity and abundance revisited: A literature review on natural resources and conflict. *International Journal of Conflict and Violence (IJCV)*, 5 (1): 155-172.

Miles-Novelo, A. and Anderson, C.A. 2019. Climate change and psychology: Effects of rapid global warming on violence and aggression. *Current Climate Change Reports*, 5: 36-46.

Mirkena, T., Walelign, E., Tewolde, N., Gari, G., Abebe, G. and Newman, S. 2018. Camel production systems in Ethiopia: a review of literature with notes on MERS-CoV risk factors. *Pastoralism*, 8 (1): 30.

Mishra, V., Wallace, J.M. and Lettenmaier, D.P. 2012. Relationship between hourly extreme precipitation and local air temperature in the United States. *Geophysical Research Letters*, 39 (16).

Mkutu, K. 2000. Banditry, cattle rustling and the proliferation of small arms, the case of Baragoi Division of Samburu District. Arusha Report.

Mkutu, K. 2001. *Pastoralism and conflict in the Horn of Africa*. London: Saferworld. Organisation.

Mkutu, K. and Marani, M. 2001. The role of civic leaders in the mitigation of cattle-rustling and small arms: The case of Laikipia and Samburu. In Nairobi: African Peace Forum.

Mobjörk, M., Krampe, F. and Tarif, K. 2020. Pathways of climate insecurity: guidance for policymakers. *SIPRI Policy Brief*, 2020-11.

Mobjörk, M., Krampe, F. and Tarif, K. 2020. SIPRI Policy Brief-PATHWAYS OF CLIMATE INSECURITY: GUIDANCE FOR POLICYMAKERS. SIPRI Policy Brief

Mohamed, A.A. 2018. Assessment of conflict dynamics in Somali national regional state of Ethiopia. *Journal of public policy and administration*, 2 (4): 40-48.

Mohamed, A.A. 2019. Pastoralism and development policy in Ethiopia: a review study. *Budapest International Research and Critics Institute-Journal*, 2 (4): 01-11.

Mohammed, J.A., Gashaw, T., Tefera, G.W., Dile, Y.T., Worqlul, A.W. and Addisu, S. 2022. Changes in observed rainfall and temperature extremes in the Upper Blue Nile Basin of Ethiopia. *Weather and Climate Extremes*, 37:100468.

Morand, S. 2015. Impact of climate change on livestock disease occurrences. *Climate Change Impact on Livestock: Adaptation and Mitigation*, 113-122.

Muluken, T.K. 2020. The role of indigenous conflict resolution mechanisms in the pastoral community: an implication for social solidarity in Somali region, Shineli woreda. *Open Access Library Journal*, 7 (2): 1-16.

Murakami, H., Vecchi, G.A. and Underwood, S. 2017. Increasing frequency of extremely severe cyclonic storms over the Arabian Sea. *Nature Climate Change*, 7 (12): 885-889.

Mussa, M., Teka, H. and Aliye, A. 2017. Indigenous conflict management and resolution mechanisms on rangelands in pastoral areas, Ethiopia. *Journal of African Studies and Development*, 10 (9): 112-117.

Nardone, A., Ronchi, B., Lacetera, N. and Bernabucci, U. 2006. Climatic effects on productive traits in livestock. *Veterinary Research Communications*, 30: 75.

Nardone, A., Ronchi, B., Lacetera, N., Ranieri, M.S. and Bernabucci, U. 2010. Effects of climate changes on animal production and sustainability of livestock systems. *Livestock Science*, 130 (1-3): 57-69.

Nastis, S.A., Michailidis, A. and Chatzitheodoridis, F. 2012. Climate change and agricultural productivity. *African Journal of Agricultural Research*, 7 (35): 4885-4893

Navone, A. 2021. The Intertwined Futures of Climate Action, Fragility and Peacebuilding. United States Institute of Peace. Analysis and Commentary. <https://www.usip.org/publications/2021/04/intertwinedfutures-climate-action-fragility-and-peacebuilding>

Neuman, W.L. 1997. *Social Research Methods: Qualitative and Quantitative Approaches*. 3rd Edition. Boston: Allyn and Bacon.

Ngcamu, B.S. and Chari, F. 2020. Drought influences on food insecurity in Africa: A Systematic literature review. *International Journal of Environmental Research and Public Health*, 17 (16): 5897.

Nicholson, S.E. 2017. Climate and climatic variability of rainfall over eastern Africa. *Reviews of Geophysics*, 55 (3): 590-635.

Nicolétis, É., Caron, P., El Solh, M., Cole, M., Fresco, L.O., Godoy-Faúndez, A., Kadleciková, M., Kennedy, E., Khan, M., Li, X. and Mapfumo, P. 2019. Agroecological and other innovative approaches for sustainable agriculture and food systems that enhance food security and nutrition. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security.

Nkomwa, E.C., Joshua, M.K., Ngongondo, C., Monjerezi, M. and Chipungu, F. 2014. Assessing indigenous knowledge systems and climate change adaptation strategies in agriculture: A case study of Chagaka Village, Chikhwawa, Southern Malawi. *Physics and Chemistry of the Earth, Parts A/B/C*, 67: 164-172.

Nkondze, M.S., Masuku, M.B. and Manyatsi, A.M. 2014. The impact of climate change on livestock production in Swaziland: The case of Mpolonjeni area development Programme. *Journal of Agricultural Studies*, 2 (1): 1-15.

O'Loughlin, J., Witmer, F.D., Linke, A.M., Laing, A., Gettelman, A. and Dudhia, J. 2012. Climate variability and conflict risk in East Africa, 1990–2009. *Proceedings of the National Academy of Sciences*, 109 (45): 18344-18349.

Ocak, S. 2016. Transhumance in Central Anatolia: A resilient interdependence between biological and cultural diversity. *Journal of Agricultural and Environmental Ethics*, 29, pp.439-453.

OCHA. 2020. Ethiopia: Humanitarian Needs Overview. United Nations Office for the Coordination of Humanitarian Affairs (OCHA). <https://www.humanitarianresponse.info/en/operations/ethiopia/document/ethiopia-humanitarian-needs-overview-january-2020>. Access: 7 August 2023

OCHA. 2021. Ethiopia Humanitarian Access Snapshot, January - June 2021.

Oels, A. 2015. Resisting the climate security discourse: Restoring “the political” in climate change politics. In *Reframing climate change*. Routledge.

Olabanji, M.F., Ndarana, T. and Davis, N. 2020. Impact of climate change on crop production and potential adaptive measures in the olifants catchment, South Africa. *Climate*, 9 (1): 6.

Ondiko, J.H., Karanja, A.M. and Ombogo, O. 2022. A Review of the Anthropogenic Effects of Climate Change on the Physical and Social Environment. *Open Access Library Journal*, 9 (2): 1-14.

Osman, M.A., Onono, J.O., Olaka, L.A., Elhag, M.M. and Abdel-Rahman, E.M. 2021. Climate variability and change affect crops yield under rainfed conditions: A case study in Gedaref State, Sudan. *Agronomy*, 11 (9): 1680.

Oyekale, A.S. 2014. Impacts of climate change on livestock husbandry and adaptation options in the arid Sahel belt of West Africa: evidence from a baseline survey. *Asian Journal of Animal and Veterinary Advances*, 9 (1): 13-26.

Özkan, Ş., Vitali, A., Lacetera, N., Amon, B., Bannink, A., Bartley, D.J., Blanco-Penedo, I., De Haas, Y., Dufrasne, I., Elliott, J. and Eory, V. 2016. Challenges and priorities for modelling livestock health and pathogens in the context of climate change. *Environmental Research*, 151: 130-144.

Pacillo, G., Carneiro, B., Resce, G., Ruscica, G., Craparo, A., Basel, A., Ramirez-Villegas, J., Achicanoy, H., Villa, V., Krendelsberger, A. and Läderach, P. 2021. Assessing the relationship between climate, food security and conflict in Ethiopia and in the Central American Dry Corridor (CADC). Quantitative analysis on the impact of climate variability on conflict in Ethiopia and in the CADC countries.

Penu, D. A. K., & Paolo, S. A. 2021. Institutions and Pastoralist Conflicts in Africa: A Conceptual Framework. *Journal of Peacebuilding & Development*, 16 (2): 224–241.

Peters, K., Mayhew, L., Slim, H., van Aalst, M., Arrighi, J. 2019. Double vulnerability: the humanitarian implications of intersecting climate and conflict risk. London: Overseas Development Institute.

Philip, S., Kew, S.F., Jan van Oldenborgh, G., Otto, F., O'Keefe, S., Haustein, K., King, A., Zegeye, A., Eshetu, Z., Hailemariam, K. and Singh, R. 2018. Attribution analysis of the Ethiopian drought of 2015. *Journal of Climate*, 31 (6): 2465-2486.

Polley, H.W., Briske, D.D., Morgan, J.A., Wolter, K., Bailey, D.W. and Brown, J.R. 2013. Climate change and North American rangelands: trends, projections, and implications. *Rangeland Ecology & Management*, 66 (5): 493-511.

Pretty, J., Toulmin, C. and Williams, S. 2011. Sustainable intensification in African agriculture. *International journal of agricultural sustainability*, 9 (1): 5-24.

Radeny, M., Desalegn, A., Mubiru, D., Kyazze, F., Mahoo, H., Recha, J., Kimeli, P. and Solomon, D. 2019. Indigenous knowledge for seasonal weather and climate forecasting across East Africa. *Climatic Change*, 156: 509-526.

Raleigh, C. and Kniveton, D. 2012. Come rain or shine: An analysis of conflict and climate variability in East Africa. *Journal of peace research*, 49 (1): 51-64.

Raleigh, C. and Urdal, H. 2007. Climate change, environmental degradation and armed conflict. *Political geography*, 26 (6): 674-694.

Raleigh, C., Choi, H.J. and Kniveton, D. 2015. The devil is in the details: An investigation of the relationships between conflict, food price and climate across Africa. *Global Environmental Change*, 32: 187-199.

Rigaud, K.K., de Sherbinin, A., Jones, B., Bergmann, J., Clement, V., Ober, K., Schewe, J., Adamo, S., McCusker, B., Heuser, S. and Midgley, A. 2018. Groundswell: Preparing for Internal Climate Migration. Washington, DC: World Bank.

Rivers, J.P., Holt, J.F., Seaman, J.A. and Bowden, M.R. 1976. Lessons for epidemiology from the Ethiopian famines. *Annales de la Société belge de médecine tropicale*, 56 (4-5): 345-360.

Rojas-Downing, M.M., Nejadhashemi, A.P., Harrigan, T. and Woznicki, S.A. 2017. Climate change and livestock: Impacts, adaptation, and mitigation. *Climate risk management*, 16: 145-163.

Rowlinson, P. 2008. Adapting livestock production systems to climate change—temperate zones. *Livestock and Global Climate Change*, 61.

Rufino, M.C., Thornton, P.K., Mutie, I., Jones, P.G., Van Wijk, M.T. and Herrero, M. 2013. Transitions in agro-pastoralist systems of East Africa: impacts on food security and poverty. *Agriculture, ecosystems & environment*, 179:215-230.

Salih, A.A., Baraibar, M., Mwangi, K.K. and Artan, G. 2020. Climate change and locust outbreak in East Africa. *Nature Climate Change*, 10 (7): 584-585.

Salman, A., Husnain, M., Jan, I., Ashfaq, M., Rashid, M. and Shakoor, U. 2018. Farmers' adaptation to climate change in pakistan: Perceptions, options and constraints. *Sarhad Journal of Agriculture*, 34 (4): 963-972.

Santos, R.M. and Bakhshoodeh, R. 2021. Climate change/global warming/climate emergency versus general climate research: comparative bibliometric trends of publications. *Heliyon*, 7(11).

Sautier, M., Martin-Clouaire, R., Faivre, R. and Duru, M. 2013. Assessing climatic exposure of grassland-based livestock systems with seasonal-scale indicators. *Climatic Change*, 120 (1-2): 341-355.

Sax, N., Hassan, G.M., Abdi, A.N., Garcia, T.F., Madurga-Lopez, I., Carneiro, B., Liebig, T., Läderach, P. and Pacillo, G. 2023. How does climate exacerbate root causes of conflict in Ethiopia?.

Schleussner, C.F., Donges, J.F., Donner, R.V. and Schellnhuber, H.J. 2016. Armed-conflict risks enhanced by climate-related disasters in ethnically fractionalized countries. *Proceedings of the National Academy of Sciences*, 113 (33): 9216-9221.

Seager, R., Liu, H., Henderson, N., Simpson, I., Kelley, C., Shaw, T., Kushnir, Y. and Ting, M. 2014. Causes of increasing aridification of the Mediterranean region in response to rising greenhouse gases. *Journal of Climate*, 27 (12): 4655-4676.

Seaman, J., Holt, J. and Rivers, J. 1978. The effects of drought on human nutrition in an Ethiopian province. *International journal of epidemiology*, 7 (1): 31-40.

Seleshi, Y. and Zanke, U. 2004. Recent changes in rainfall and rainy days in Ethiopia. *International Journal of Climatology: A Journal of the Royal Meteorological Society*, 24 (8): 973-983.

Serbessa, H., Makonnen, T. and Abi, M. 2023. The contribution of urban agriculture to household food security among urban vegetable producers in Addis Ababa, Ethiopia. *Journal of Sustainable Development in Africa*, 25(1).

Sethi, A. 2018. The Framing of a Famine: A case study of Ethiopia (Doctoral dissertation). Uppsala Universitet.

Sharma, V.P., Köhler-Rollefson, I. and Morton, J. 2003. Pastoralism in India: a scoping study. *Indian Institute of Management and League of Pastoral Peoples, Ahmedabad, India*.

Sida (The Swedish International Development Cooperation Agency). 2018. The relationship between climate change and violent conflict. Green tool box/Peace and security tool box: Working paper, 2017. International Organisations and Policy Support, Sida.
<https://www.sida.se/contentassets/c571800e01e448ac9dce2d097ba125a1/working-paper---climate-change-and-conflict.pdf>

Sisha, T.A. 2020. Household level food insecurity assessment: Evidence from panel data, Ethiopia. *Scientific African*, 7: 00262.

- Smith, L.C. and Frankenberger, T.R. 2022. Recovering from severe drought in the drylands of Ethiopia: Impact of Comprehensive Resilience Programming. *World Development*, 156: 105829.
- Snorek, J., Renaud, F.G. and Kloos, J. 2014. Divergent adaptation to climate variability: a case study of pastoral and agricultural societies in Niger. *Global Environmental Change*, 29: 371-386.
- Stark, J., Terasawa, K. and Ejigu, M. 2011. Climate change and conflict in pastoralist regions of Ethiopia: mounting challenges, emerging responses. *Conflict Management and Mitigation (CMM) Discussion Paper*, 4.
- Stark, J., Terasawa, K. and Ejigu, M. 2011. Climate change and conflict in pastoralist regions of Ethiopia: mounting challenges, emerging responses. *Conflict Management and Mitigation (CMM) Discussion Paper*, 4.
- Stott, P.A., Gillett, N.P., Hegerl, G.C., Karoly, D.J., Stone, D.A., Zhang, X. and Zwiers, F. 2010. Detection and attribution of climate change: a regional perspective. *Wiley interdisciplinary reviews: climate change*, 1 (2): 192-211.
- Sweijjs, T., De Haan, M. and Van Manen, H. 2022. Unpacking the Climate Security Nexus Seven Pathologies Linking Climate Change to Violent Conflict. *The Hague Centre for Strategic Studies*.
- Tadege, A. 2007. "Climate Change National Adaptation Programme of Action (NAPA) of Ethiopia", Ministry of Water Resources and National Meteorological Agency, Addis Ababa
- Tadesse, B., Beyene, F., Kassa, W. and Wentzell, R. 2015. The dynamics of (agro) pastoral conflicts in eastern Ethiopia. *Ethiopian Journal of the Social Sciences and Humanities*, 11 (1): 29-60.
- Tadesse, G. and Dereje, M. 2018. Impact of Climate Change on Africa-Review. *Climate Change*, 4 (15): 299-313.
- Tamou, C. 2017. Understanding relations between pastoralism and its changing natural environment. PhD thesis, Wageningen University, Wageningen, the Netherlands (2017).

- Tan, S. and Hassen, N.A. 2023. Examining the choice of land conflict resolution mechanisms: The case between the harshin and yocaale woredas of the Somali region of Ethiopia. *Journal of Environmental Management*, 342: 118250.
- Taye, M., Simane, B., Zaitchik, B.F., Selassie, Y.G. and Setegn, S. 2019. Rainfall variability across the agro-climatic zones of a tropical highland: the case of the jema watershed, northwestern Ethiopia. *Environments*, 6 (11): 118.
- Tefera, F.F. 2023. Ethiopia's 1984/85 famine and the Red Terror Trials. *Third World Quarterly*, 1-19.
- Tegegne, A., Ayele, Z.E.W.D.U. and Hoekstra, D. 2011. Farmer innovations in livestock feeding and management in semi-arid areas of Ethiopia.
- Tenaw, Z.T. 2016. Indigenous institutions as an alternative conflict resolution mechanism in eastern Ethiopia: The case of the Ittu Oromo and Issa Somali clans. *African Journal on Conflict Resolution*, 16 (2): 85-109.
- Tesfaw, T.A. 2022. Internal displacement in Ethiopia: a scoping review of its causes, trends and consequences. *Journal of Internal Displacement*, 12 (1): 2-31
- The Food Security Information Network. 2021. Global Report on Food Crises; FSIN: Rome, Italy, 2021; pp. 45–55, 140–144. Available online: https://docs.wfp.org/api/documents/WF0000127343/download/?_ga=2.127598664.414706713.1636619949-2019868009.1636493962
- Thébaud, B. and Batterbury, S. 2001. Sahel pastoralists: opportunism, struggle, conflict and negotiation. A case study from eastern Niger. *Global environmental change*, 11 (1): 69-78.
- Theisen, O.M. 2017. Climate change and violence: Insights from political science. *Current Climate Change Reports*, 3: 210-221.
- Thomas, T. and Berisso, T. 2020. Pastoral Conflict, Emerging Trends and Environmental Stress in Nyangatom, Southern Ethiopia. *Ethiopian Journal of the Social Sciences and Humanities*, 16 (2): 111-132.

- Thomson, K.J. 2010. Climate Change and Agriculture: an Economic Analysis of Global Impacts, Adaptation and Distributional Effects. By R. Mendelsohn and A. Dinar. Cheltenham, UK: Edward Elgar (2009), pp. 256, ISBN 978-1-84720-670-1. *Experimental Agriculture*, 46 (2): 259-259.
- Thornton, P.K., Herrero, M.T. and Ericksen, P.J. 2011. Livestock and climate change. *Livestock Exchange Issue Brief*.
- Thornton, P.K., van de Steeg, J., Notenbaert, A. and Herrero, M. 2009. The impacts of climate change on livestock and livestock systems in developing countries: A review of what we know and what we need to know. *Agricultural systems*, 101 (3): 113-127.
- Tierney, J.E., Ummenhofer, C.C. and Demenocal, P.B. 2015. Past and future rainfall in the Horn of Africa. *Science advances*, 1 (9): 1500682.
- Tigistu, S. and Hegena, B. 2022. Determinants of food insecurity in food aid receiving communities in Ethiopia. *Journal of Agriculture and Food Research*, 10: 100391.
- Tiruneh, S. and Tegene, F. 2018. Impacts of climate change on Livestock production and productivity and different adaptation strategies in Ethiopia. *Journal of Applied and Advanced Research*, 3 (3): 52-58.
- Tittonell, P. and Giller, K.E. 2013. When yield gaps are poverty traps: The paradigm of ecological intensification in African smallholder agriculture. *Field Crops Research*, 143: 76-90.
- Tofu, D.A., Fana, C., Dilbato, T., Dirbaba, N.B. and Tesso, G. 2023. Pastoralists' and agro-pastoralists' livelihood resilience to climate change-induced risks in the Borana zone, south Ethiopia: Using resilience index measurement approach. *Pastoralism*, 13 (1): 4.
- Tsegay, B. and Kenton, N. 2022. 1 Social protection for pastoral livelihood systems in Ethiopia. *Social Protection, Pastoralism and Resilience in Ethiopia: Lessons for Sub-Saharan Africa*, 1.
- Tsegaye, D. 2015. Market Access and Food Security among Ethiopian Pastoralists. *Food Policy*, 55 : 103-111.

- Tubiello, F.N., Amthor, J.S., Boote, K.J., Donatelli, M., Easterling, W., Fischer, G., Gifford, R.M., Howden, M., Reilly, J. and Rosenzweig, C. 2007. Crop response to elevated CO₂ and world food supply: a comment on “Food for Thought...” by Long et al., *Science* 312: 1918–1921, 2006. *European journal of agronomy*, 26 (3): 215-223.
- Tufa, T. 2024. Conflict, climate change and displacement in the Somali Region of Ethiopia. HPN, Humanitarian Practice Network, Issue 84 - Article 11, 2024.
- Tulu, D., Gadissa, S., Hundessa, F. and Kebede, E. 2023. Contribution of Climate-Smart Forage and Fodder Production for Sustainable Livestock Production and Environment: Lessons and Challenges from Ethiopia. *Advances in Agriculture*, 2023.
- Turner, M.D. 2004. Political ecology and the moral dimensions of “resource conflicts”: the case of farmer–herder conflicts in the Sahel. *Political geography*, 23 (7): 863-889.
- Turner, M.D., Ayantunde, A.A., Patterson, K.P. and Patterson III, E.D. 2011. Livelihood transitions and the changing nature of farmer–herder conflict in Sahelian West Africa. *The journal of development studies*, 47 (2): 183-206.
- U.S. Geological Survey. 2012. “Report on a climate trend analysis of Ethiopia”, doi: 10.3133/fs20123053
- Uddin, M.E. and Kebreab, E. 2020. Impact of food and climate change on pastoral industries. *Frontiers in Sustainable Food Systems*, 200.
- Uhe, P., Philip, S., Kew, S., Shah, K., Kimutai, J., Mwangi, E., van Oldenborgh, G.J., Singh, R., Arrighi, J., Jjemba, E. and Cullen, H. 2018. Attributing drivers of the 2016 Kenyan drought. *International Journal of Climatology*, 38:554-568.
- Ulrichs, M., Slater, R. and Costella, C. 2019. Building resilience to climate risks through social protection: from individualised models to systemic transformation. *Disasters*, 43: 368-387.
- United Nations Office of the Coordination of Humanitarian Affairs report (OCHA). 2022. ETHIOPIA Situation Report Last updated: 22 Jul 2022. <https://reliefweb.int/report/ethiopia/ethiopia-situation-report-22-jul-2022>
- Urdal, H. 2008. Population, resources, and political violence: A subnational study of India, 1956–2002. *Journal of Conflict Resolution*, 52 (4): 590-617.

USAID (United States Agency for International Development), Food Assistance Fact Sheet Ethiopia, 2020. April, 2020

USAID (United States Agency for International Development). 2016. Resilience at USAID 2016 progress report. Washington, DC: USAID. Center for Resilience.

van Baalen, S. and Mobjörk, M. 2016. A coming anarchy?: Pathways from climate change to violent conflict in East Africa. Stockholm: Stockholm University;

van Weezel, S. 2019. On climate and conflict: Precipitation decline and communal conflict in Ethiopia and Kenya. *Journal of Peace Research*, 56 (4): 514-528.

Verschuur, J., Li, S., Wolski, P. and Otto, F.E. 2021. Climate change as a driver of food insecurity in the 2007 Lesotho-South Africa drought. *Scientific reports*, 11 (1): 3852.

Vesco, P., Dasgupta, S., De Cian, E. and Carraro, C. 2020. Natural resources and conflict: A meta-analysis of the empirical literature. *Ecological Economics*, 172: 06633.

Viste, E., Korecha, D. and Sorteberg, A. 2013. Recent drought and precipitation tendencies in Ethiopia. *Theoretical and Applied Climatology*, 112: 535-551.

Von Uexkull, N. 2014. Sustained drought, vulnerability and civil conflict in Sub-Saharan Africa. *Political Geography*, 43:16-26.

Von Uexkull, N., Croicu, M., Fjelde, H. and Buhaug, H. 2016. Civil conflict sensitivity to growing-season drought. *Proceedings of the National Academy of Sciences*, 113 (44): 12391-12396.

Ward, C. and Ruckstuhl, S. 2017. *Water scarcity, climate change and conflict in the Middle East: securing livelihoods, building peace*. Bloomsbury Publishing.

Warfa, A. 2021. What now for the Somali Region in Ethiopia? World Peace Foundation. Internet: <https://sites.tufts.edu/reinventingpeace/2021/11/17/what-now-forthe-somali-region-in-ethiopia/>. Access: 4 May 2023

Wassie, S.B. 2020. Natural resource degradation tendencies in Ethiopia: a review. *Environmental systems research*, 9: 1-29

Wassie, S.B., Mengistu, D.A. and Birlie, A.B. 2023. Agricultural livelihood resilience in the face of recurring droughts: Empirical evidence from northeast Ethiopia. *Heliyon*, 9(6).

Wheeler, T. and Reynolds, C. 2013. Predicting the risks from climate change to forage and crop production for animal feed. *Animal frontiers*, 3 (1): 36-41.

Wilhite, D.A. and Glantz, M.H. 1985. Understanding: the drought phenomenon: the role of definitions. *Water international*, 10 (3): 111-120.

World Bank and UN. 2018. Pathways for Peace: Inclusive Approaches to Preventing Violent Conflict (International Bank for Reconstruction and Development/World Bank: Washington, DC, 2018)

World Bank. 2006. Ethiopia: Managing water resources to maximize sustainable growth (Report No 36000-ET). *Washington, DC, World Bank*

World Bank. 2006. Ethiopia: Managing water resources to maximize sustainable growth (Report No 36000-ET). *Washington, DC, World Bank.*

World Bank. 2017. *Ethiopia Country Environmental Analysis: Realizing Green Transformation*. World Bank.

World Bank. 2021. *Climate Risk Country Profile: Ethiopia*. The World Bank Group

World Food Programme. 2020. WFP Ethiopia, Country Brief May 2020, 2020; and IPC, Ethiopia IPC Acute Food Insecurity Analysis, October 2020–September 2021, 2020.

World Health Organization (WHO). 2022. Greater Horn of Africa (Food Insecurity and Drought). WHO: Geneva. [https://www.who.int/publications/m/item/greater-horn-of-africa--\(food-insecurity-and--drought\)](https://www.who.int/publications/m/item/greater-horn-of-africa--(food-insecurity-and--drought)). Access: 4 September 2023

World Vision. 2023. 1980s Ethiopia famine: Facts, what's changed, how to help. Internet: <https://www.worldvision.org/disaster-relief-news-stories/1980s-ethiopia-famine-facts>. Access: 1 November 2023

Worqlul, A.W., Dile, Y.T., Schmitter, P., Bezabih, M., Adie, A., Bizimana, J.C., Srinivasan, R., Lefore, N. and Clarke, N. 2021. Constraints of small-scale irrigated

fodder production and nutrition assessment for livestock feed, a case study in Ethiopia. *Agricultural Water Management*, 254,106973.

Yadav, B., Singh, G., Verma, A.K., Dutta, N. and Sejian, V. 2013. Impact of heat stress on rumen functions. *Veterinary World*, 6 (12): 992.

Yatoo, M.I., Kumar, P., Dimri, U. and Sharma, M.C. 2012. Effects of climate change on animal health and diseases. *International Journal of Livestock Research*, 2 (3): 15-24.

Yizgaw, G.S. and Abitew, E.B. 2019. Causes and impacts of internal displacement in Ethiopia. *African Journal of Social Work*, 9 (2): 32-41.

Yilma, Z., Haile, A., GuerneBleich, E. and Ababa, A. 2009. Effect of climate change on livestock production and livelihood of pastoralists in selected pastoral areas of Borana, Ethiopia. *ESAP Proceedings*.

Yuan, X., Wang, L., Wu, P., Ji, P., Sheffield, J. and Zhang, M. 2019. Anthropogenic shift towards higher risk of flash drought over China. *Nature communications*, 10 (1): 4661.

Zhang, W., Persoz, L., Hakiza, S., Biru, L. and Girmatsion, L. 2022. Impact of COVID-19 on Food Security in Ethiopia. *Epidemiologia*, 3 (2): 161-178.

