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Internal Conflicts in Africa: Climate Change Vulnerability and Violent Conflicts

Doctoral Dissertation

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Zadání disertační práce

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In modern days Africa suffers from various types of political violence that we can notice almost all across the continent. One of the main issues that lie behind the violent conflicts seems to be climate change. This phenomenon has great influence on politics in Africa mainly because the poor countries hardly resist to the changes in climate and environment. Needless to say, these changes lead to absence of vital resources that could easily provoke minor or even great conflicts. The issues connected to climate change is easy to observe in Sahel but also in South Africa. There are few different schools of understanding relationships between climate change and conflicts (e. g. Environmental Security and Political Ecology) (Raleigh 2010). Unfortunately, scholars are not united about the mechanism and dynamics of influence of this phenomenon (cf. Homer-Dixon and Blitt 1998, Buhaug 2015; Benjamisen 2008, Benjaminsen et al. 2012, Raleigh 2010, Theisen 2012; Adano et al. 2012). Generally, this link is complex and multi-causal phenomena.

The aim of the doctoral theses is to present analyses of influence of climate change on incidence of violent conflicts in Africa in recent years. The author will discuss the causes and configurations under which climate change leads to incidence of conflict in Africa. Based on the traditional theories the research focus is on the conditions and context under which climate change influences or does not influence conflicts as both theoretical schools present influence of climate in highly contextual sense (Ide 2015; Raleigh 2010; Homer-Dixon and Blitt 1998). For the goal of the research configurational methods are used. Configurational comparative methods are used mainly to show which and how different conditions influence the presence of conflict. In which way is population density connected with access to water leading to internal conflicts? Is there any interdependent influence of human well-being, inequality and quality of democracy on conflict incidence? The theses will be based on data of ACLED, World Bank or CRED. Recently mainly CRED was able to gather deep data on disasters, climate change that makes it easier to work with big data.

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Zadávající pracoviště: Katedra politologie, Filozofická fakulta

Vedoucí práce: prof. PhDr. Maxmilián Strmiska, Ph.D.

Datum zadání závěrečné práce: 20.4.2018

Declaration

I declare that I have carried out the doctoral dissertation on my own under the supervision of prof. PhDr. Maxmilián Strmiska, PhD. and have presented all the sources and literature utilized.

In Brno, July 9, 2023

Martin Schmiedl

Annotation

Schmiedl, M. (2023). *Internal Conflicts in Africa: Climate Change Vulnerability and Violent Conflicts* (Doctoral Dissertation) Hradec Králové: Philosophical Faculty, University of Hradec Králové.

Africa is in the spotlight of many scholars in the case of climate change. Furthermore, very often many scholars connect climate change with the rise of the conflicts on the continent. However, these conclusions could be sometimes overly simplistic and miss the complex reality of the mutual interaction. This dissertation focuses on climate change vulnerability and conditions that turn vulnerability into violent internal conflicts. With the use of various theories (Environmental Security, Political Ecology etc.) and inter-disciplinary approach it evaluates the influence of the climate change vulnerability in African countries and other political, social and structural variables on conflict incidence. It concludes that in the case of violent civil conflicts, it is mainly political marginalisation together with regime instability or government ineffectiveness and rather bad access to land while in the case of violent inter-communal conflicts, it is marginalisation or fear of marginalisation that is often connected with political strategies of elites and politicisation of topics such as access to land.

Keywords: *Conflicts, Climate Change, Environmental Security, Political Ecology, Africa*

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Acknowledgement

Writing a dissertation is a long-term affair. In my case, it took even longer than I would have liked. From the first moment, I knew that I wanted to write about and do research on the violence and conflicts in Africa. However, the conceptualization and the long-time searching for a gap brought me more and more struggle and depression. In the end, I realized that I wanted to write about a topic that I am more personally interested in – climate change. However, even in this case the dissertation was not an easy job. Finally, I understood all PhD student struggles - all the demotivation, constant stress, the feeling of failure, depression, loneliness – that nothing will prepare you for. While writing the dissertation, I faced these challenges as many of my colleagues have as well. I suffered from depression, loneliness, and those times when you do not know how to keep going and when you feel lost and without any job leads. I sacrificed a lot, maybe too much. The depression and demotivation occurred mainly during 2020 and 2021 and were my daily partners, unfortunately. While I had already finished most of the dissertation, I struggled to find the motivation to finish it and to find trust in the research, academia and an academic career again. This led me so far that I even decided to quit academia for some time and interrupt my studies. During that time, my data get older while waiting for me to finally properly analyse and discuss the last two discussion cases. In the end, with the support of my family and my friends, particularly Stephanie Rudwick, I was able to rediscover my lost motivation and finish what I had started such a long time ago. It was her, my academic hero, who provided me with the new motivation through our collective project. This dissertation captures several years of my life and my attempt to add my humble addition to the study of conflicts in Africa.

I would like to thank my alma mater, the University of Hradec Králové and my supervisor prof. Maxmilián Strmiska who gave me great supervision and amazing advice. He always had time to discuss my topic and had influential ideas on my work, mainly in the first years of my study. Dr. Jaroslav Bílek deserves to be mentioned as he was helpful with discussing methodological issues and some of my academic struggles. Similarly, I have to thank Dr. Barbora Vališková and Dr. Stanislav Myšička who were always there to discuss research problems while standing outside of the faculty and drinking coffee. Last but not least, Dr. Stephanie Rudwick, even though the topic of this dissertation is not

her field, she was here as my mentor, important colleague and mainly friend who helped me during my hard times when I lost all of my motivation to finish this work. It is thanks to her and her stubborn position on my comeback to academia. It was her who wanted me to try it again and not waste the time I had already spent as a PhD student. She saved my career with our collective project and publications.

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To my mom, family, friends and loved ones who have always believed in me.

List of Abbreviations

ACLED - Armed Conflict Location and Event Data Project

AGRA – Aliance for Green Revolution in Africa

CCKP - Climate Change Knowledge Portal

C-H model – Collier-Hoeffler model

CKP - Climate Knowledge Portal

COW - Correlates of War

CRED - Centre for Research on the Epidemiology of Disasters

CRU – Climatic Research Unit

cs/QCA – crisp-set QCA

DPA - Darfur Peace Agreement

EM-DAT - Emergency Events Database

EU – European Union

FAO - Food and Agriculture Organization

fs/QCA – fuzzy-set QCA

GDP - Gross domestic product

ICC - International Criminal Court

ICG - International Crisis Group

IDP – Internally Displaced Person

IPCC - Intergovernmental Panel on Climate Change

ISWAP - Islamic State West Africa Province

KADU - Kenya African Democratic Union

KANU - Kenya African National Union

MEND - Movement for the Emancipation of the Niger Delt

mv/QCA – multi-value QCA

NASA - National Aeronautics and Space Administration

NGO - Non-governmental organization

PIK - Potsdam Institute for Climate Impact Research

PRI - Proportional Reduction in Inconsistency

PRIO - Peace Research Institute Oslo

QCA - Qualitative Comparative Analyses

QCA-CS – complex solution of QCA

QCA-IS – intermediate solution of QCA

QCA-PS – parsimonious solution of QCA

UCDP - Uppsala Conflict Data Programme

UNDP - United Nations Development Programme

UNEP – United Nations Environment Programme

UNHCR - United Nations High Commissioner for Refugees

"You say you love your children above all else, and yet you are stealing their future in front of their very eyes."

Greta Thunberg, 2018 U.N. plenary in Katowice, Poland

"You have stolen my dreams, my childhood with your empty words and yet I am one of the lucky ones."

Greta Thunberg, 2019, UN climate action summit in New York

Introduction

The world is radically changing. More than ever before we are talking about climate change and its influence on people, societies, nature or life in general (e.g., Kane, 2021; Peyton, 2020; Washington, 2019; Fick, 2020; Mouterde, 2022; Selormey & Logan, 2019). This phenomenon is strikingly important as it has become the topic for politicians, scientists from different fields of research, but also activists, among whom the most active are the young ones (e.g., Fridays for Future, 2023; Thunberg, 2018, 2019). Every day, we read reports and predictions about how the changes in the climate and environment is bringing stress to the life of ordinary people. The influence of climate change is not problem just in the "Global North" but also and maybe with an even bigger impact in the "Global South."

Africa is no exception. However, in this respect we speak more than in the "Global North" about the potential influence of climate change in relation to conflicts. In recent years, we have observed a growing number of conflicts, particularly internal conflicts in different parts of Africa. We have observed radical Islamism, the Tuareg rebellion, and the farmers-herders conflict in Mali, the farmers-herders conflict, Boko Haram and the ISWAP insurgency in Nigeria, and electoral and inter-communal violence in Kenya. Some argue that some of these violent events in Africa have one factor in common – the influence of climate change through environmental scarcity (e.g., Onuoha, 2010; Rizzo, 2015; Burke et al., 2009). The reason lies in the argument that mainly the poor countries of the "Global South" are influenced by environmental stress and climate change (Homer-Dixon, 1994, p. 6; O´Loughlin, Linke & Witmer, 2014, p. 16712). Although climate change seems to be a new variable that came into our understanding of the incidence of conflicts in Africa at its very roots, it is not. Climate change deeply impacts the

environment, living standards, and, of course, politics all across the world and Africa is no exception. Even today we observe desertification, droughts, floods, land degradation, water scarcity, deforestation, and destruction of fishing, etc. In societies that are as much dependent on agriculture and fishing as Africa is, this could lead to terrible ends.

This thesis claims allegiance to the long history of the study of environmental influence on human societies. This tradition can be traced to Thomas Malthus who as one of the first put together a coherent theory of how stress between a growing population and a finite amount of resources will, in the end, result in conflicts (Floyd & Matthew, 2013, 3; Homer-Dixon, 1999, p. 28).[1] Today, this topic is, beside other things, mainly connected to the research of climate change influence (Floyd & Matthew, 2013, pp. 10–11). In this regard, geographical and environmental determinism is nothing new, starting with the already mentioned Thomas R. Malthus (2001[1798]), through Paul Ehrlich (1988) and the team of Donella Meadows (1972) to Robert Kaplan's (1994) overly deterministic position and the idea that environmental change, a finite amount of resources and the growing population will destroy humankind. In recent years, this has transformed heavily into research on climate change and the environmental influences on conflicts as we can see growing trend in research of conflicts (for review, e.g., Koubi, 2019; Gleditsch, 2012).

Unfortunately, the debate on the climate-conflict nexus does not seem to find consensus about the mechanism and the way climate influences the incidence of conflicts. The reason probably lies in the complicated and partially still not fully understood mechanism of climate change's role in environmental change, incomplete data or simply the wrong methodology (Theisen, 2008, pp. 813–814; Buhaug, 2015; Koubi et al., 2012: p. 114; Ide, 2015, p. 61; Gleditsch, 2012, p. 4). As will be shown below, some papers even prove that there are counter-intuitive results or rather a dismissive conclusion about the influence of climate and environmental change, the growing temperature or reduced precipitation (e.g., Witsenburg & Adano, 2009; Adano et al., 2012; Theisen, 2012; Butler & Gates, 2012; Slettebak, 2012; Koubi et al., 2012; Benjaminsen, 2008). Tobias Ide

[1] If we follow some off the earliest roots of environmental security some authors place it with Thucydides (Floyd & Matthew, 2013, p. 3) or Plato and Confucius (Homer-Dixon, 1999, p. 28). Rod Neumann (2004, p. 16) places it with ancient Greek and "modern environmental determinism" then to Halford Mackinder or Ellen Semple and Elsworth Huntington who presented "environmentalist writings on cultural hierarchies appear now as overly racialized, indeed racist, indicating the affinities of environmental determinism with the cotemporaneous fields of social Darwinism and eugenics."

(2015, p. 62) aptly sums up that there are generally three reasons behind disagreement in the research community: 1) we are not focusing on the difference between conflict and violent conflicts; 2) the contextuality of climate change and; 3) we are limited to a just a small set of methods (single case or large-N). These problems seem to be significant and, in particular, strongly interconnected. In a nutshell, maybe too often we rely on data that are not precise, work on different levels of analyses, face conceptual problems and have methodological disagreements.[2] To understand conflicts we need both a high contextual understanding but also big data. Africa in several points presents a region that is highly contextual with its history and geography. However, data could often be misleading. Today, we can agree with Halvard Buhaug (2015) or Jon Barnett (2018) that climate change is not a direct cause but more likely a facilitator or intervening variable.

The purpose of the thesis is to shed more light on the climate change-conflict nexus and its contextuality, and attempts to participate in the growing amount of research on this topic. While mainly it heavily engages with literature on security studies and environmental security, it is deeply rooted in African studies and inter-disciplinary research.

The goal of the thesis

As mentioned above, the context is important in the case of the climate-conflict nexus. This was discussed by Homer-Dixon and Blitt (1998), Buhaug (2016), Ide (2015) and many others. Therefore, the niche in this research field seems to lie in the understanding of the mutual interplay of various factors and the contextuality of climate change's impact on conflicts in Africa. Here it is important to mention that by Africa the dissertation understands sub-Saharan continental Africa. The dissertation thus does not include North Africa (Algeria, Egypt, Libya, Morocco, Tunisia and Western Sahara), but it does include Sudan. The reason behind this is mainly in cultural and also political differences between North Africa and sub-Saharan Africa. Although it is clear that both parts have much in

[2] These problems are particularly influential in the case of Africa. Mainly, in the case of large datasets every researcher has to use data with a bit of reservation. Also, these days one of the most important problems in the study of African politics are the different levels of data. For example, we rely on data on the state level but most of the conflicts happened on the regional or even communal level.

common (Schmiedl & Prouza, 2021, p. 25–26), it is also evident that from a political and cultural point of view, North Africa has much closer ties to the Middle East.

The dissertation approaches the topic on two levels. First, it investigates the climate change vulnerability of African countries and subsequently it analyses contextual factors that in the most vulnerable countries cause a rather high incidence of violent conflicts. Thus, it searches for the answers when this vulnerability to climate change transforms itself into the presence of violent conflicts. It attempts to show how contextual factors affect each other and, in the end, lead to violent conflicts in climate change-vulnerable countries in Africa in recent years. The aim of this study is not to establish any general theory of the climate change-conflict nexus. With the focus on Africa, this is not possible; more likely, this thesis offers a humble insight into a long and inconclusive debate and presents analytical and contextually embedded analyses that focus on four main research questions:

1) *How does climate change manifest itself in Africa and how does it influence various sectors of human life in Africa?*
2) *What are the most climate change-vulnerable countries in Africa?*
3) *Under what conditions do climate change-vulnerable countries suffer from a rather high incidence of violent civil conflicts?*
4) *Under what conditions do climate change-vulnerable countries suffer from a rather high incidence of inter-communal violent conflicts?*

By answering these questions, the goals of this thesis are two. With this research, the thesis aims to show how different theoretical perspectives could be mutually complementing. As I have already claimed in a previous study, there is a strong need to use different theoretical and epistemological points of view as "rather complementary" (Schmiedl, 2023). The second main goal is empirical and focuses on the causes and mechanisms behind the occurrence of violent conflicts in African countries in connection to climate change, that is seen through climate change vulnerability. The hypotheses with which this research works with are set later in Chapter 4.2.

Brief Theoretical Basis and Literature Review

The thesis is deeply rooted in the tradition of Environmental Security (e.g., Homer-Dixon, 1999; Kahl, 2006; Baechler, 1999), Political Ecology (e.g., Peluso & Watts, 2001; Le Billon, 2001; Robbins, 2012), but also Security and Conflict studies (e.g., Collier & Hoeffler, 2004; Gurr, 1970; Stewart, 2008; Fearon & Laitin, 2003). It builds on the notion that each of these theoretical backgrounds has its own contribution to knowledge on conflict incidence, influences of environment and climate change and other factors while they are also mutually complementary. In this regard, it follows the recent call for mutual cooperation of environmentally focused theories and an epistemological position (Ide et al., 2023; Schmiedl, 2023). As stated by Ide et al. (2023, p. 24), the "sustained dialogue between [...] research streams offers unique opportunities to challenge established wisdoms." Indeed, diverse streams of the climate change-conflict nexus, Environmental Security, Political Ecology and Conflict studies could mutually enrich each other. In this thesis, each of the above-mentioned streams has its position in the framework used here.

The approach that is built on the mutual conversation of often said theoretical counterparts (e.g., Theisen, 2008; Raleigh, 2010) is based on two levels of analyses: climate change vulnerability and analyses of conditions that lead to a higher incidence of violent conflicts. While Environmental Security is mainly used for the conceptualisation of climate change-vulnerability (Chapter 4), Conflict studies and Political Ecology is predominantly used to contextualise the choice of conditions in Qualitative Comparative Analysis (QCA) (Chapter 6). However, this thesis also works with numerous studies from various research fields like development studies, health studies, climatology, and environmental studies. These are mainly used in the contextualisation of the climate change influence in Africa and the discussion of the various influences climate change has in Africa. In conclusion, this work heavily draws on an inter-disciplinary approach and the variability of knowledge of different fields and theories. As the debates and conclusions are more than broad, a deeper review of the theories is presented later in a sole chapter.

In fact, the topic of research on the climate change-conflict nexus in Africa is nothing new. One could undoubtedly say that Africa has a prominent place in climate change-conflict research. We can find many studies that focus on the direct impact of

temperatures on conflicts in Africa (Burke et al., 2009; Theisen, 2012; O'Loughlin, Linke & Witmer, 2014), the influence of rainfall (Witsenburg & Adano, 2009; Raleigh & Kniveton, 2012; Theisen, 2012; O'Loughlin, Linke & Witmer, 2014), the influence of climate extremes, such as droughts (Detges, 2017; Linke et al., 2018) or the indirect influence of climate change on conflicts (Raleigh, Choi & Kniveton, 2015) and the contextuality of influences of climate extremes (Detges, 2016; Ide et al., 2020). These and other authors use a various range of methods; some use rather quantitative approaches (e.g., Burke et al., 2009; Theisen, 2012; Adano et al., 2012; Witmer et al., 2017; Devitt & Tol, 2012), while others depend on field research, ethnographic, or history approaches (Turner et al., 2011; Benjaminsen, 2008; Schilling, Opiyo & Scheffran, 2012). However, non-mainstream or multi-method approaches are sometimes also used (Ide et al., 2020). In this regard, there is a clear diversity of approaches and conclusions. In the case of geographical scope, on the other hand we can conclude that most of the research focuses on East Africa, particularly Kenya, and the Sahel, or in the case of quantitative studies on the whole of Africa (cf. Benjaminsen, 2008; Schilling, Opiyo & Scheffran, 2012; Burke et al., 2009; Theisen, 2012; Hendrix & Salehyan, 2012; O'Loughlin, Linke & Witmer, 2014). One thing is for sure, there is hardly any clear agreement about the consequences of climate variability or change. While it is clear that there is some kind of influence of climate on everyday lives and for example the economy, as will be shown in Chapter 1, in the case of conflicts some authors rather decline its influence (e.g., Benjaminsen, 2008; Benjaminsen et al., 2012) in favour of political variables while others show restrained support (e.g., Burke et al., 2009; Raleigh & Kniveton, 2012). However, the conclusions are very often dependent on the choice of variables, the level of analyses or the method. This is discussed in a deeper literature review of the climate change-conflict nexus in Chapter 3.2.

Due to the fact that the main goal of this dissertation is to focus on conflicts, the need for further conceptualisation of conflicts is significant. We can find many of the various concepts, some broader, while others more straightforward. This thesis focuses on internal conflicts, particularly on what is later called violent inter-communal and violent civil conflicts. Although the use of the first term is clear, the second, violent civil conflicts, has been deliberately chosen due to the symbolism and "subjectivity" of the more commonly used term civil war (Canestaro, 2016). Also, similarly to for example

Jackson (2002) the thesis uses term internal conflicts instead of intra-state conflicts. As we will see below, often these terms are used as synonyms. However, from the point of view of this thesis the term intra-state automatically expects state agency in conflicts while this does not have to be true in case of inter-communal conflicts. Due to the fact, that the dissertation heavily depends on ACLED dataset (ACLED, 2020; Raleigh et al., 2010), this also leads to very straightforward definitions and operationalisation that follow a possible type differentiation based on actors in conflicts (ACLED, 2019). As it will be discussed later in the dissertation violent inter-communal conflicts are understood as violent events between communities and violent civil conflicts include events between government and rebel groups.

The Argument

Even though part of the theory and framework is built on Environmental Security and arguments of Homer-Dixon (1999) or Kahl (2006) the main argument rather combines it together with the arguments of Political Ecology (e.g., Le Billon, 2001; Floyd & Matthew 2013; Raleigh, 2010). Although these two positions are often presented as theoretical counterparts, the argument of the thesis is in line with the argument of Simon Dalby (2010) about their mutual complementarity.

This dissertation argues that while vulnerability to climate change places countries into an unpleasant position and leaves them vulnerable, it is mainly inequality or rather marginalisation of some groups inside of the states that directs them to a higher incidence of violent conflicts. While this condition is the most important and necessary for violent civil conflicts, judging on the basis of QCA results, it is important to highlight that marginalisation is not solely sufficient either for civil or for inter-communal violent conflicts. Other conditions like access to land (through land degradation, institutional settings of the land tenure system or both), regime stability, and the political strategy of elites seem to be important. However, it also depends on type of conflict.

Therefore, the dissertation offers a point of view that goes beyond environmental and climatic determinism and shows why some climate change vulnerable countries become more conflictual than others. In this regard, it presents the empirical evidence on conflicts in sub-Saharan Africa through which it points to the importance of other contextual factors beyond climate change or environmental conditions.

Methods and Data and Temporal and Geographical Scope

As mentioned above, the problem of internal conflicts and particularly the influence of climate change is highly contextual. Therefore, the choice of method was made under this influence. The main method used in the dissertation is Qualitative Comparative Analysis. This method is highly contextual and facilitates an understanding of the mutual influence of different conditions (Ragin, 2008, pp. 8–9). The method itself is presented in Chapter 5, however, the choice of this method was deliberate. First, the method is still rather non-mainstream. This means that it fits the methodological gap mentioned above (Ide, 2015). Second, it is suitable for an enquiry into a smaller or intermediate number of cases (Berg-Schlosser et al., 2009; Ide & Mello, 2022). Third, and maybe the most important, it enables one to explore mutual relationships between independent variables, i.e., conditions (Ragin, 2008).

The thesis focuses on continental sub-Saharan Africa between 2000 and 2017. In this regard, except for North Africa, it also excludes islands mainly for geographical and historical reasons. Similarly to North Africa, while islands have much in common with continental Africa, it is also quite clear that they are in many ways different. This is particularly visible, for example, in the case of the rather democratic governance that is linked to what some authors call "islandness" and "smallness" (Sanches et al., 2022). These particular features also influence conflicts. While even African islands suffered from political violence and some kinds of conflict due to their specific geographic and political features, they have been excluded from this research.

Regarding data, this thesis relies heavily on various databases such as Armed Conflict Location and Event Data Project (ACLED, 2020; Raleigh et al., 2010), Varieties of Democracy (Coppedge et al., 2019; Coppedge et al., 2019a; Pemstein et al., 2019), Polity 5 (INSCR, 2019), and World Bank Databank (2020, 2020a, 2020b, 2020c, 2020d, 2020e, 2020f, 2020i, 2020j, 2020k). Climatic data was gathered from the Climate Change Knowledge Portal (World Bank Group, 2020) and the Emergency Events Database (EM-DAT, 2019). However, besides the quantitative data, this dissertation also uses a number of reports of NGOs, newspapers or governmental organisations that will mainly be used in the discussion of results from QCA.

Structure

The thesis proceeds with the background chapter on climate change and its impact in Africa. This chapter discusses historical trends and future projections of climate change in Africa but also the manifestation of climate change and its consequences in various sectors of food security, health, and poverty.

The following two chapters focus mainly on a deep discussion of the conceptual and theoretical framework of conflicts. First, Chapter 2 starts with a discussion and conceptual overview of conflict operationalisation and the way conflicts are conceptualised in this thesis. Then it proceeds with the discussion on current theoretical and empirical knowledge on the causes of conflicts with a particular focus on theories grounded in greed and grievance discussion, and Environmental Security and Political Ecology. A particular focus is dedicated to the review of current knowledge on the influence of environmental and climate change on conflicts and various variables used in this research.

Chapter 4 presents the main framework of the dissertation. First, the climate change vulnerability framework is presented and is further used to derive cases for further analyses. This framework is based on concepts and theories discussed in previous chapters. This is followed by a presentation of hypotheses that are built on previous theoretical chapters.

Chapter 5 mainly presents basics about Qualitative Comparative Analysis as the main method used in this thesis and operationalisation of used variables. This is important as this method is still rather new and non-mainstream, and therefore, it is important to introduce it to the reader. Chapter 6 and 7, as the main body of the thesis, present the results of Qualitative Comparative Analysis and also four discussion cases (Somalia, Nigeria, Sudan and Kenya) that aim to answer the third and fourth research question. Last but not least, in conclusion, the results are further discussed with possible weaknesses and future possible avenues of research of the climate-conflict nexus.

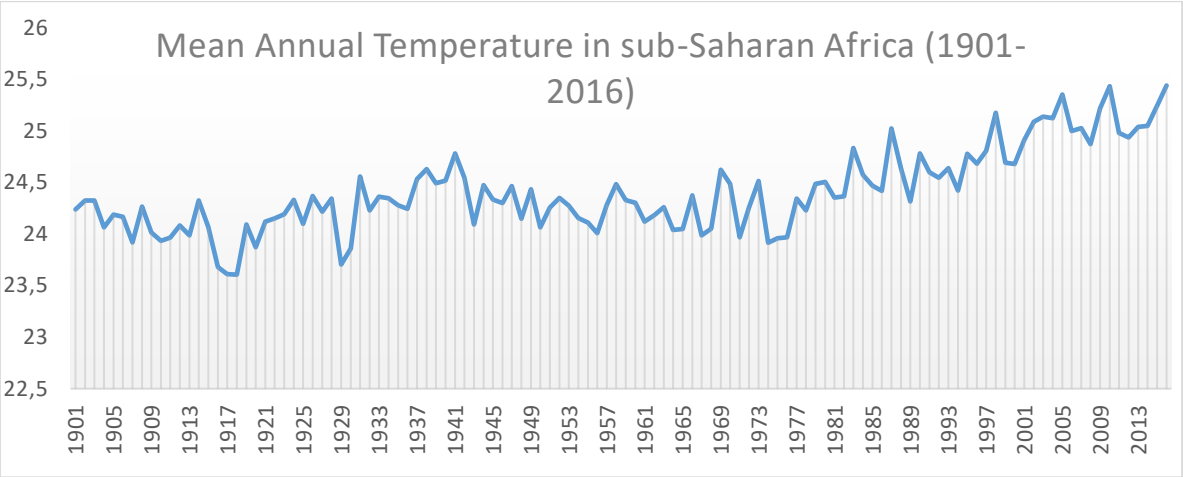
1 Climate and Environmental Change and its Impacts in Africa

Africa seems to already be a hotspot for climate change impacts. Due to its structure of GDP, underdevelopment or bad infrastructure, most African countries are heavily vulnerable (cf. Boko et al., 2007; Niang et al., 2014). Recently, many newspapers around the globe reported on the impacts of climate change in Africa and its lack of preparation (cf. Selormey & Logan, 2019; Goering, 2020; Washington, 2019; Trenchard, 2020; Sengupta 2018). Even African leaders seem to react, at least on paper (UN Climate Press, 2019).[3] However, the situation in Africa still seems to be unpleasant. According to diverse reports, African countries suffer and will suffer from rising temperatures, changing patterns of rainfalls and other changes that influence agriculture, health, economy and development (Boko et al., 2007; Niang et al., 2014). In general, African countries seem to be much more vulnerable to climate change not just because of their physical characteristics but also due to diverse political and infrastructural factors (cf. Boko et al., 2007, p. 435; Busby et al., 2012, p. 464; Busby et al., 2013, p. 136).

Before we can approach any models, reviews of climate-conflict nexus theories or resource scarcity theories, it is important to browse through a contextual understanding of climate change influence in Africa in general. How does climate change manifest in Africa? What are our future projections about temperatures and how does this influence other factors? This is an important starting point for understanding the way climate change plays in any point of human lives.

[3] Most African states signed the critical agreements about climate change.

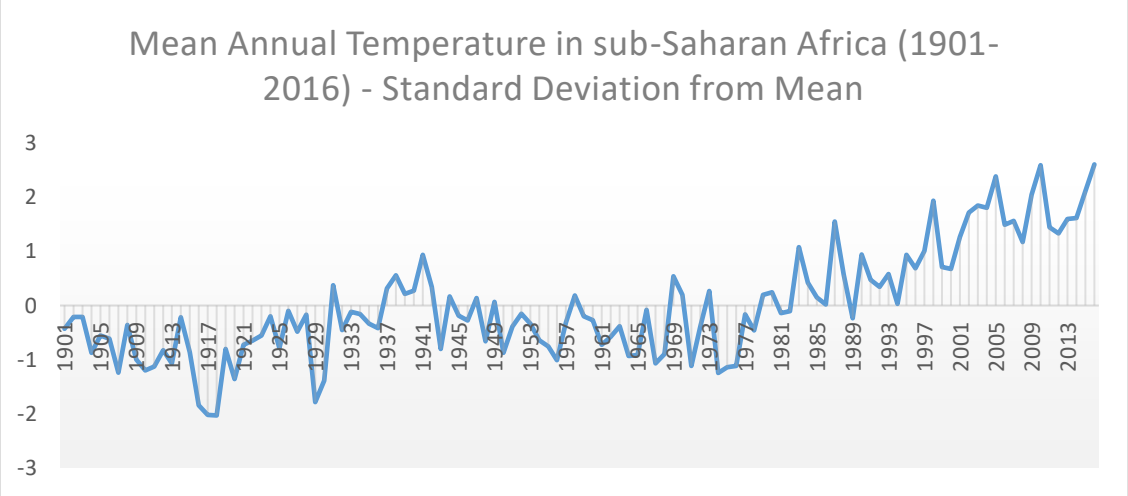
Figure 1Mean Temperature in sub-Saharan Africa



(Author's calculation based on data from Climate Change Knowledge Portal see at World Bank Group, 2020)

There is no doubt about the global warming that is also happening in Africa (Boko et al., 2007, p. 443; Niang et al., 2014, p. 1202; Serdeczny et al., 2017, p. 1586). In the last 100 years, the temperature in sub-Saharan Africa has slightly risen on average (see Fig. 1). The trend is even more visible in the chart that shows mean temperature as a number of standard deviations from the mean between the years 1901 and 2016 (see Fig. 2). This trend of slowly rising temperature will be much faster in the future. It is often mentioned that in Africa, global climate change and its impacts will be faster and much stronger (James & Washington, 2013, p. 863).

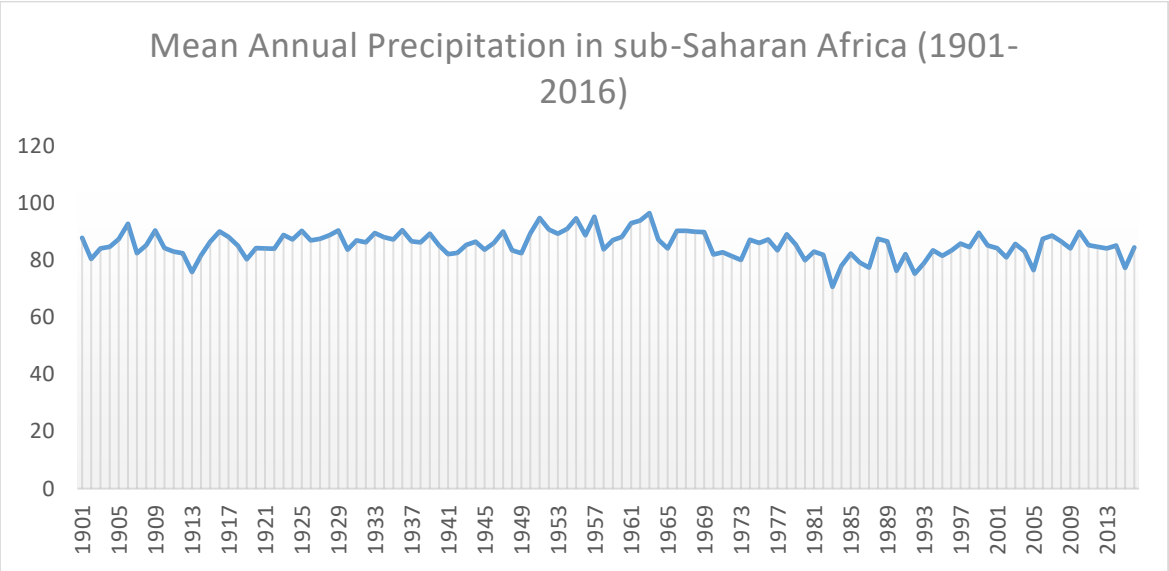
Figure 2 Mean Annual Temperature - Standard Deviation from Mean (1901-2016)



(Author's calculation based on data from Climate Change Knowledge Portal see at World Bank Group 2020)

The situation of precipitation historically is much more complicated to evaluate as we can see further on in the chapter (see Fig. 3). It seems to be much more regionally dependent. There are great regional and seasonal differences in projections, and it is even hard to find some trends in historical data (Serdeczny et al., 2017, p. 1587; James & Washington, 2013, pp. 863–865; Vizy & Cook, 2012, p. 5766; New et al., 2006; Boko et al., 2007: p. 436; Niang et al., 2014, p. 1202). Actually, as we can see further on in this chapter, some African regions are projected to be rather wetter than dryer (James & Washington, 2013) which goes against the general public assumption that climate change will bring more dry weather. This fact is important also for historical data and is the reason why it is not easy to evaluate some general historical trends.

Figure 3 Mean annual precipitation in sub-Saharan Africa (1901-2016)

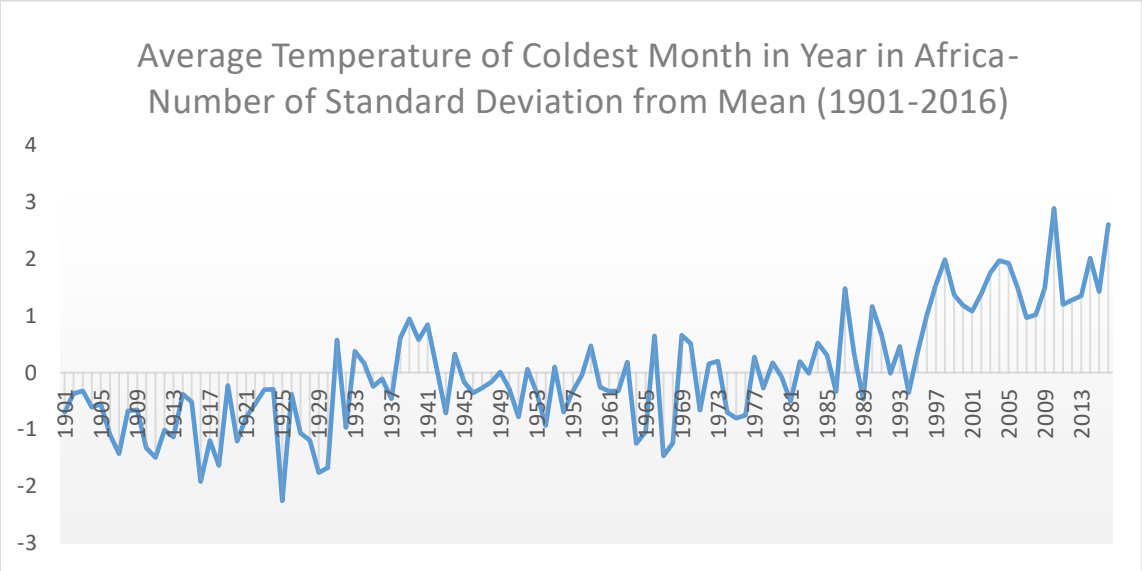


(Author's calculation based on data from the Climate Change Knowledge Portal, see World Bank Group, 2020)

First, let's take a closer look at the historical record of temperatures and our projected expectations in Africa. Roughly from the mid-century, we have observed rising temperatures around Africa with some regional specifics (PIK, 2013, p. 20). This was also supported by the reports of the Intergovernmental Panel on Climate Change (IPCC) in its report from 2014 (Niang et al. 2014, p. 1202). As we can see in Figure 2, with a few exceptions from the 1980s and clearly from the 1990s, the annual mean temperature in Africa did not fall below the mean temperature in Africa between 1901 and 2016. Mark New et al. (2006) support this with their research on daily extremes. With data on daily

maximum and minimum temperatures from 1961 to 2001, they conclude that "[e]xtremely cold days and nights decreased, and hot days and nights have increased" (New et al., 2006, n.p.). This could also be supported by data on the average temperature of coldest and hottest month in Africa where we also observe a slight increase (see Fig. 4 and 5). As we can see, the annual mean minimum and maximum temperatures seem to cross the 115-year average and did not fall below it starting from the 1990s.

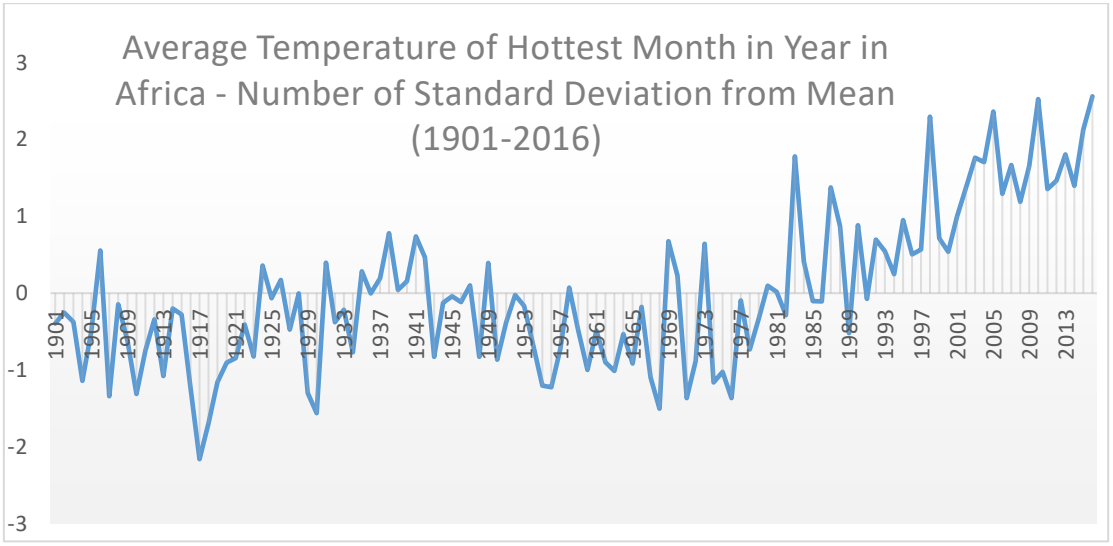
Figure 4 Average of Temperature of Coldest Month in Year in Africa- Standard Deviation from Mean (1901-2016)



(Author's calculation based on data from Climate Change Knowledge Portal, see World Bank Group, 2020)

Our expectation about the development of climate change and global warming is not in any way better. Even though it depends on the climatic model used for projections, we can certainly expect quite significant changes in temperature. Olivia Serdeczny and her colleagues expect at best (low-emission scenario) that "African summer temperatures

Figure 5 Average of Temperature of Hottest Month in Year in Africa - Standard Deviation from Mean (1901-2016)



(Author's calculation based on data from Climate Change Knowledge Portal see World Bank Group, 2020)

increase until 2050 at about 1.5 °C above the 1951–1980 baseline" and at worst (a high-emission scenario that "monthly summer temperatures over Sub-Saharan Africa reaching 5 °C above the 1951–1980 baseline by 2100" (Serdeczny et al., 2017, p. 1586).[4]

This notion is also supported by Edward Vizy and Kerry Cook (2012, pp. 5765–5766) who show that "heat wave days" will increase all over Africa and also both poles of extreme temperatures will rise, leading to higher maximum and also minimum temperatures. According to PIK[5] (2013, p. 28), projections of hot nights would prevail in Africa under the worst scenario. However, this could be highly reduced with suitable "green" policies. It is important to say that we can find small differences across various regions in Africa. Some regions will experience bigger changes while others have smaller ones. For example, according to the Climate Change Knowledge Portal data from 2020 in Burkina Faso and Ethiopia, the projected increase is about 2°C with a high-emission scenario (Burkina Faso 2.2°C, Ethiopia 2°C) by mid-century while in Niger or Mali, we

[4] This is also confirmed by the Postdam Institute for Climate Impact Research and Climate Analytics (PIK, 2013, p. 20) in its report *Turn Down the Heat.*

[5] Potsdam Institute for Climate Impact Research and Climate Analytics

expect a rise by 2.5°C (World Bank Group, 2020).[6] In general, it is projected that Africa will be warming more (James & Washington, 2013).[7]

Our expectations about precipitations are much more complicated and more regionally dependent (Vizy & Cook, 2012, 5766; James & Washington, 2012; Serdeczny et al 2017, pp. 1587–1589; Kendon, Stratton et al. 2019). Some authors even show that precipitation has historically had no significant trend (New et al., 2006). Therefore, it is much harder for us to make some general conclusion as some regions seem to become wetter while some are dryer. For example, if we compare the mean annual precipitation for the Sahel[8] and East Africa[9] we can see big differences in the magnitude of precipitation (see Fig 6) but we can also agree with other scholars (New et al., 2006) that it is very hard to find some trend in the mean annual precipitation in those regions. IPCC reported with the reserved agreement about Sahel being dryer while some parts of East Africa were wetter in past decades (Niang et al., 2014, p. 1209).[10]

[6] This projection changed slightly according to the latest data which are more disaggregated. For example, in case of the worst scenario for example in Mali by 2040-2059, the increase of temperature would be by 2.31°C against the 1995-2014 mean temperature in the Tombouctou region. In the case of Burkina Faso, it is 1.77°C in the region of Sahel which is the region with the highest expected change against the 1995-2014 mean temperature (World Bank Group, 2023)

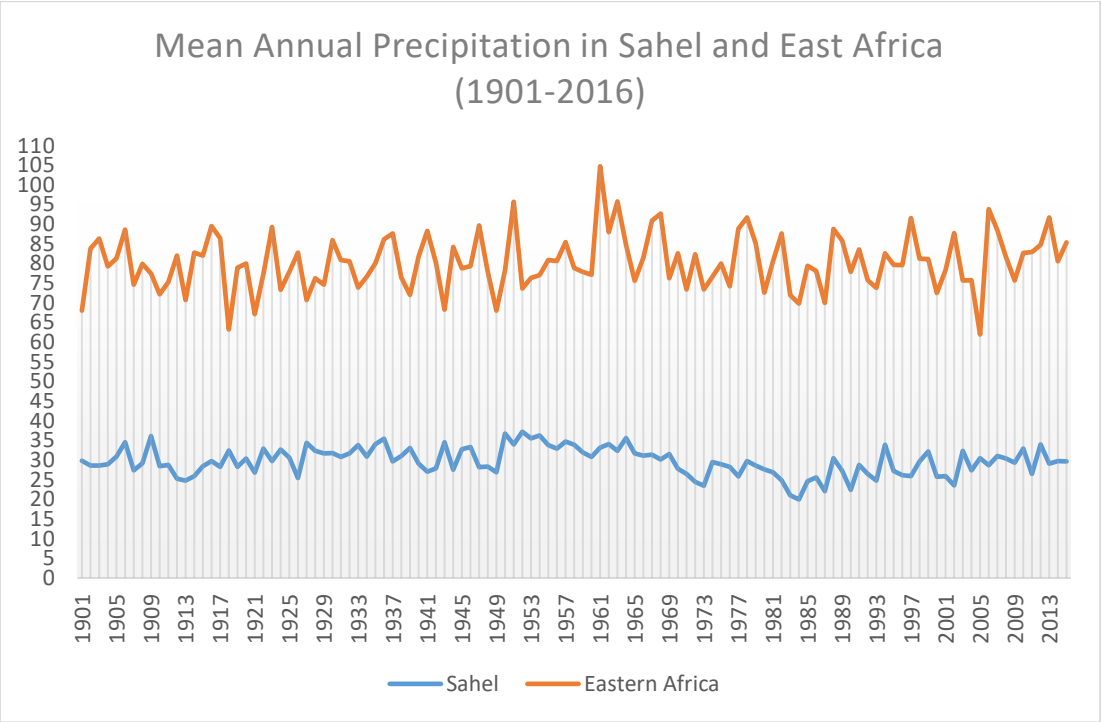
[7] The projection by Rachel James and Richard Washington (2013, p. 863) shows that with global warming at 2°C, Africa warms by 2.3°C.

[8] Burkina Faso, Mali, Mauritania, Niger and Chad

[9] Kenya, South Sudan, Tanzania and Uganda.

[10] In the case of the Horn of Africa, Omondi et al. (2014) prove that it became drier from 1961 until 2010.

Figure 6 Mean Annual Precipitation in the Sahel and East Africa



(Author's calculation based on data from the Climate Change Knowledge Portal, see World Bank Group, 2020)

Even though climatology in Africa has difficulties with reliable data, this does not mean that we cannot find some regional trends and meaningful projections in our projections (Niang et al., 2014, p. 1209; James et al., 2018, p. 316). James and Washington (2013, p. 863) projected various precipitation models for different levels of warming. While at 1°C, there is little significant change, from 2°C higher the changes seem to be stronger and more significant. Again, as already mentioned, James and Washington (2012) predict broad regional differences with East Africa becoming wetter while Southern Africa and the coastline of West Africa and the west Sahel being dryer. IPCC (Niang et al 2014, p. 1202) and others (Serdeczny et al., 2017, pp. 1587–1589; PIK, 2013, p. 28) also predict similar projections when it forecasts mainly Ethiopia and Eastern Africa to be wetter while Southern Africa dryer. In some predictions, it is important to distinguish different methodologies in approaching precipitation change. For example, Vizy and Cook (2012, pp. 5765–5766) calculate "extreme wet day rainfall intensity" and a "number of extreme wet days." This is important as it can give us idea about the whole pattern of the precipitation in the region. As they conclude: "Over West Africa, both the number of dry and intense rainfall days during the boreal summer are projected to increase indicating

that the summer rainfall will be delivered in fewer, but more intense events" (Vizy & Cook, 2012, p. 5766). Maybe surprisingly they also conclude that the Sahel will suffer from more intensive rainfalls (Ibid.). They support this conclusion in a recent article when they conclude that for Sahel "precipitation intensification" is expected (Han, Cook & Vizy, 2019, p. 2773).[11] This is not typical. The reason could be that the Sahel could be understood as quite a large area. James and Washington (2013, p. 864, pp. 868–870) differentiate between the West and Central Sahel. While drying is projected for West Sahel, Central Sahel seems to be wetter. Similarly, Marco Gaetani et al. (2020, n. p.) show when projecting the "time of emergence of climate change" that West Sahel will be drier while East Sahel is predicted to be rather wetter. Elizabeth Kendon, Rachel Stratton et al. (2019) point to changes in the wet season term. The pattern of precipitation is also very important, and the occurrence of extreme weather is critical as we have seen in the case of Vizi and Cook (2012) and Han, Cook and Vizy (2019). In one of the most recent studies, a collective of authors around Elizabeth Kendon and Rachel Stratton sum up an expectation about extreme weather and inter-regional variation as follows:

> In the future, both models show increases in mean and extreme precipitation across much of Africa… Decreases in mean precipitation are seen in some west and south–west regions, with decreases in rainfall occurrence; in these regions, there is still a tendency for rainfall intensity and extremes to increase. (Kendon & Stratton et. al., 2019)

Therefore, there could be more extreme precipitation however in some areas with less occurrence of rainfall. This is even more problematic in the situation of longer dry seasons as it seems that there will be

> a significant lengthening of dry spells during the wet season over the Sahel, Gulf-of-Guinea and Central Africa; over the Gulf-of-Guinea, dry spells exceeding 10 days are almost twice as frequent in the future compared with the present day. (Kendon & Stratton et. al., 2019)

[11] This could be also connected to the monsoon system over West Africa, which influences the climate in Sahel (Cook & Vizy, 2019).

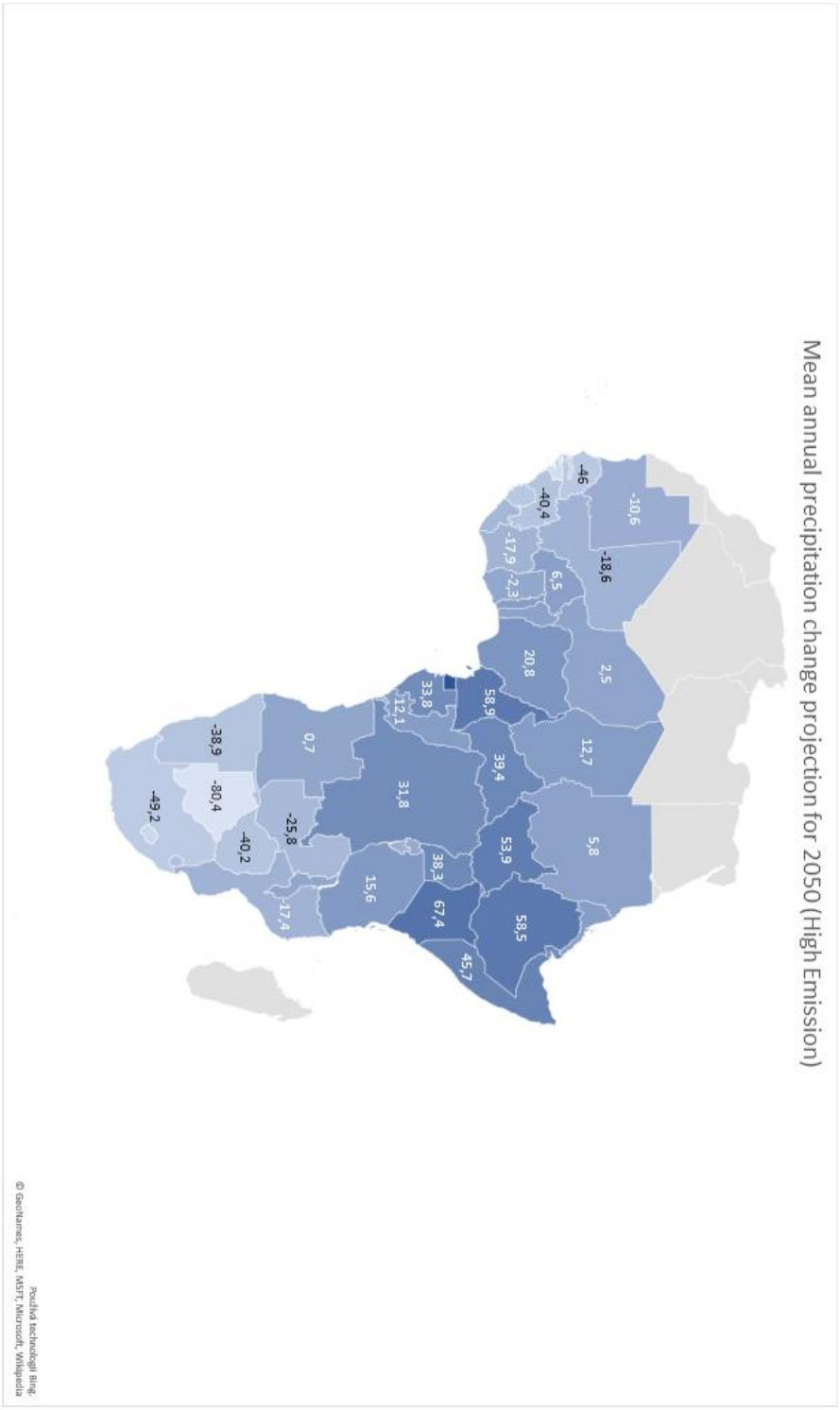
Weather extremes could be very problematic in the end. Even though on average there could be higher precipitation, the few occurrences of heavy rains cannot substitute long-term lighter rains. According to the Climate Change Knowledge Portal by World Bank Group (2020) data from 2020 on mean precipitation change projections, some regions seem to show an intra-regional variability, while other projections are following the patterns mentioned above (see Fig. 7). For example, in the Sahel, projections in Mali for 2050 show a precipitation decrease by 18.6 mm while Niger and Burkina Faso according to projections appear to experience a future increase in precipitation by 2.2 mm and 6.5 mm respectively. Similarly, West Africa[12] shows some intra-regional variability. It seems that further to the west in this region rainfall is likely to decrease. Togo, Nigeria and Cameroon will experience a rise in rainfall in 2050 (World Bank Group, 2020). Even though much of West Africa will be dryer on average, it is important to remind that it will suffer from more frequent heavy rains (Vizy & Cook, 2012, p. 5766; Busby et al., 2014, p. 725; Sylla et al., 2016, p. 36). Central Africa[13] except for Burundi and Rwanda, are also projected to have rising rainfalls. East Africa and the Horn of Africa[14] both seem to be coherent as all countries are expected to be wetter with rising levels of precipitation ranging from

[12] Senegal, Guinea, Liberia, Ghana, Gambia, Guinea-Bissau, Sierra Leone, Côte d'Ivoire, Togo, Benin, Nigeria, Cameroon

[13] Angola, Burundi, Equatorial Guinea, Gabon, Republic of Congo, DRC, Rwanda, Central African Republic

[14] Djibouti, Eritrea, Ethiopia, Somalia, Sudan

Figure 7Mean annual precipitation in 2050 (High Emission)



(Source of data: Climate Change Knowledge Portal, see World Bank Group, 2020)

5.8 mm in Sudan to 67.4 mm in Kenya. Southern Africa will show decreasing precipitation (World Bank Group, 2020).[15] Therefore, from literature and data mentioned above, we can clearly expect changes, but the changes cannot be so easily generalized as in the case of temperature. Precipitation projections are in many ways much more diverse.

However, to conclude, we can find cautious agreement for example about a wetter East Africa, and dryer Southern Africa on average. Sahel somehow seems to be inconclusive and uncertain even though it also seems to suffer from more heavy rains but with intra-regional differences in mean precipitation (Serdeczny et al., 2017; Shongwe et al., 2009; James & Washington, 2013; Vizy & Cook, 2012; Busby et al. 2014; World Bank Group, 2020; Sylla et al., 2016; PIK, 2013; Han, Cook & Vizy, 2019). Anyway, these changes still influence African societies and economies in a similar pattern as drying or wetting on average (Niang et al., 2014, pp. 1209–2010; James & Washington, 2013, pp. 868–870).

To conclude, there is support for extensive climate change around Africa already in the 20th and furthermore in the 21st century. Changes in temperatures and precipitation seem to be significantly supported. However, we must take those results with some reserve as Africa, particularly, suffers from bad accessibility of climatic data. While some regions are clearly over-represented in studies (West Africa) others (Central Africa) are underrepresented mainly due to the availability of reliable data (James et al., 2018, p. 327). Also, some regional models seem to be problematic due to a "significant degree of uncertainty" because of the high complexity of climatic factors (PIK, 2013, p. 20)[16]

Climate change heavily influences the environment and society. Africa is very often highlighted as the most vulnerable region in the world to environmental and climate change (Boko et al., 2007, p. 436; Niang et al., 2014, pp. 1202–1204; Busby et al., 2012; Busby et al., 2013; Busby et al., 2014). A slowly changing climate already influences, ecosystems, agriculture, health and poverty in countries. Further changes in climate will put even more stress on African countries (Niang et al., 2014, pp. 1202–1204; Boko et al., 2007, p. 436). The change could manifest in a slow change in precipitation or rising

[15] According to the newest data by the Climate Change Knowledge Portal (World Bank Group, 2023), precipitation will even exhibit considerable intra-country differences in the future.

[16] PIK (2013, p. 20) mentions West and East Africa.

temperature but also climate disasters, like floods or droughts that could occur more often (Niang et al., 2014, p. 1221). Disasters put major stress on the population as they can influence agriculture, food security but also health and livelihood as will be shown below. The vulnerability[17] to climate change is extensively interconnected. Africa, particularly, is vulnerable due to diverse socio-political stressors such as a growing population, bad technological know-how, simple geographical vulnerability, bad infrastructure, bad governance or even historical grievances (Busby et al., 2012, p. 464). For example, according to Clionadh Raleigh, Lisa Jordan and Idean Salehyan (2008, p. 16) nine out of twelve countries that are the most vulnerable globally are African.[18]

In their research, the team around Joshua Busby (Busby et al., 2012, 2013, 2014) is mapping the most climate-security vulnerable countries in Africa. They present an extensive study of vulnerable countries with the use of an index combining not just physical and environmental factors but also social and political ones.[19] In the last and the most precise model, they find that the most vulnerable areas in the 20th century are countries on the southern border of the Sahara like Chad, Niger, Mauritania or Sudan with some countries from West Africa (Guinea, Sierra Leone) or East Africa (Ethiopia). In the 21st century, it is mainly the Sahel with countries from other regions like Ethiopia, Malawi, Zimbabwe or parts of West Africa (Busby et al. 2014, pp. 725–726).[20] In all three models, some of the countries are vulnerable due to changing patterns of precipitation, some due to higher temperatures, however, in some cases, the vulnerability is intensified because of bad governance (Busby et al., 2012, p. 465; Busby et al., 2013, p. 162–165; Busby et al., 2014, p. 726). Let´s now look at diverse sectors that become vulnerable due to climate change. We could divide them into three sectors except for a direct influence on conflicts which will be discussed later: 1. Agriculture, Soil and Food Production, 2.

[17] For a review of diverse concepts and indexes of vulnerability see Raleigh, Jordan and Salehyan (2008) or Busby et al. (2013).

[18] They measure vulnerability with an index that combines projected population, GDP per capita and the number of disasters (Raleigh, Jordan & Salehyan, 2008, p. 13).

[19] The index includes "physical exposure, population density, household and community resilience, and governance and political violence" (Busby et al., 2014, p. 719).

[20] In the model from 2012, they identify Madagascar, coastal West Africa, coastal Nigeria, western Ethiopia, and DRC (Busby et al., 2012, p. 465). Later, in the model from 2013, they similarly find DRC, parts of West Africa and South Sudan as the most vulnerable (Busby et al., 2013, p. 136).

Health and Water, 3. Poverty, Migration and Urbanization. Obviously, these sectors are interconnected (Boko et al., 2007, p. 440).

Agriculture, access to land and food production is very often mentioned as the most significantly influenced by stress increased by climate and further environmental change (Niang et al., 2014, p. 1202; Boko et al., 2007, p. 436; Connolly-Boutin & Smith, 2016). According to the Green Revolution in Africa (AGRA) and other scholars, Africa is heavily dependent on precipitation as an absolute majority of agriculture is rainfed (AGRA, 2016, p. 155; Brown et al., 2011, p. 635). With changing patterns of precipitation and temperature, this is a reason to worry (PIK, 2013, p. 19). These changes already influence and, in the future, will add further stress to food security as rainfed agriculture is becoming more and more unstable due to climate change (Barrios, Ouattara & Strobl, 2008, p. 297; AGRA, 2016, p. 176; Tambo & Abdoulaye, 2013, p. 375). The reasons are not just the changing temperatures, precipitation or occurrence of droughts and floods, but also the influence of crop diseases (Niang et al., 2014, pp. 1220–1221).[21] The entire food security is therefore worsening. Agricultural areas have to fight growing aridity and soil degradation that influence the harvests (PIK, 2013, p. 21; pp. 30–31; Bunce, Rosendo & Brown, 2010, pp. 421–422). This pushes farmers to adapt their farming to continuing changes (Tambo & Abdoulaye 2013, 386). Other areas dependent on fishing, particularly coastal areas of for example West Africa, are also influenced. With the growing temperature of oceans, fish are migrating to different areas than before (PIK, 2013, pp. 20, 23). To conclude, climate change adds additional stress/multiplier to the already problematic area of food security. Fishing, farming but also pasturage are affected by climate change on several levels, starting from the insufficiency of areas suitable for those activities through production and ending with storage (Niang et al., 2014, p. 1221; PIK, 2013, pp. 20–23, 45).

Food insecurity also brings a problem with health and malnutrition. The circle of malnutrition and other health issues is a vicious one. As a consequence of bad food security, malnutrition leads to susceptibility to other health problems and makes the treatment of diverse diseases much harder. It also influences human development and

[21] For a review of the influence of climate change on agriculture, see Niang et al. (2014), Boko et al. (2007), Serdeczny et al. (2017) or PIK (2013).

poverty. Due to changing patterns of rainfall, temperatures, possible floods or droughts, geographical distribution and the occurrence of diverse diseases are also shifting (PIK, 2013, p. 23; Serdeczny et al., 2017, pp. 1593–1594; Niang et al., 2017, p. 1203).[22] Various diseases connected with water and sanitariness (cholera) could appear due to floods and extreme precipitation (Niang et al., 2014, p. 1222). Vector-borne diseases like malaria may appear or disappear in different regions simply because of changing temperatures. Literature on malaria transmission expects changing patterns and the geographical location of malaria (Parham & Michael, 2010; Ermert et al., 2012; Caminade et al., 2014; Ngarakana-Gwasira, Bhunu et al., 2016; Mordecai et al., 2020). According to Paul E. Parham and E. Michael (2010, p. 625), malaria transmission is highly influenced by precipitation patterns. The same applies for temperature although it has a much more complex connection as it "effects, by affecting in multiple parts of the pathogen life cycle" (Ibid.). According to Volker Ermert et al. (2012, p. 83) malaria will disappear in some regions and appear in others with changing temperatures and rainfalls. For example, there could be an increase in East Africa and a decrease in the Sahel (Ermert et al. 2012, p. 80–82). Similarly, Ngarakana-Gwasira, Bhunu et al. (2016) confirm the geographical change when malaria will move more to the highlands. However, some authors argue that climate change is not the main driver of change in geographical patterns (Hay et al., 2002). Other authors argue that malaria could make space for other diseases like arboviruses due to climate changes as arboviruses better persist in higher temperatures (Mordecai et al., 2020).[23] Diseases are linked with sanitation and access to water. In general, poor sanitation influences the transmission of diseases (PIK, 2013, p. 56). The problem is that in Africa the quality of water, in general, is poor (Boko et al., 2007, p. 441). Climate change in this situation is just another stressor (Niang et al., 2014, p. 1202). According to some models, in case of a continuously growing population scenario, water availability will worsen in the whole of Africa (PIK, 2013, p. 36). However, data and projections about climate change's impact on water access are very limited (PIK, 2013, p. 35; Niang et al., 2014, p. 1218). It is intricate to make an absolutely clear conclusion as this topic is highly complex. However, health and water security linked to climate and environmental

[22] For a review, see Patz et al. (2005) or more recent Niang et al. (2014, pp. 1222–1224).

[23] It is important to note that the authors also acknowledge the geographical factor. Hence, in some regions, malaria could newly appear while in others it will be pushed out (Mordecai et al., 2020, pp. e417–e418)

change seems to be a grave burden for African societies mainly because of its connection to other problems. We can argue that various diseases and poor water management cost African countries money and development. For example, John Gallup and Jeffrey Sachs (2000) show in the case of malaria that countries with high occurrences of malaria have grown slower. Similarly, Abiola Fatimah Adenowo, Babatunji Emmanuel Oyinloye et al. (2015) argue about the similar impact of schistosomiasis. This is even worse when even countries like South Africa, which probably has the most developed health and research system out of African countries, seems to have a very vulnerable health sector to climate change (Chersich & Wright, 2019). This leads us to the last bucket of sectors.

All the already mentioned issues are directly or indirectly linked to issues of poverty (cf. Hope, 2009). Migration is, on the other hand, one of the possible ways of adaptation (Raleigh, Jordan & Salehyan, 2008, p. 19). An influential study by Casey Brown, Robyn Meeks, Kenneth Hunu & Winston Yu (2011) proves that climate variability and unexpected extreme events (mainly droughts) have a direct negative influence on economic growth in Africa. A similar influence of climate change on economic production in Africa is proved by other scholars (cf. Abidoye & Odusola, 2015; Baarsch et al., 2020). This is highly significant, as climate change may be an important factor in the economic development of African countries. It is general knowledge that African countries are highly dependent on agriculture and extreme events and disasters like droughts and floods, in connection with bad infrastructure have a great impact on the economy and wealth of the population. Casey Brown and his colleagues conclude:

> Rural populations dependent on rainfed agriculture, who make up 93% of the population of SSA, remain immensely vulnerable to drought. The cumulative negative effects of drought and other traps lead to a poverty trap of highly vulnerable, low productivity subsistence level agriculture. In this study, severe drought was strongly associated (99%) with increasing poverty counts […]. (Brown et al., 2011, p. 635)

This conclusion perfectly depicts the vicious circle and problem with the negative impact of climate change on societies in Africa. The link between poverty and climate change is multi-level when several factors influence it on different levels, directly and indirectly, while mutually strengthening themselves, too. Of course, societies have various

adaptability and resilience to climate change but with growing poverty and poor development such adaptability and resilience are weakened and, in the end, leading to even worse situations. Poverty and marginalisation themselves make societies vulnerable (Busby et al., 2012, p. 464; Busby et al., 2013, p. 154; Hope, 2009, p. 459). Such impacts lead to diverse adaptation strategies. Sometimes people choose internal migration as a possible strategy (Raleigh, Jordan & Salehyan, 2008). According to testimony on BBC's News *Life at 50°C - Mauritania: Shifting Sands* a worker at a salt mine clearly states that due to climate changes he has "no choice but to look for work elsewhere" (BBC News, 2021). This could particularly lead to urbanisation which could also, unfortunately, be another stressor (PIK, 2013, p. 55; Serdeczny et al., 2017, pp. 1294–1295). The risk of fast urbanization lies in creating highly vulnerable poor urban areas (PIK, 2013, p. 23). The problem, hence, is not direct migration but its consequences (Raleigh, Jordan & Salehyan, 2008, p. 38).

This chapter aimed to sketch the situation and implications of climate variability and climate change influence in Africa. This topic on its own could serve as the whole book, therefore, some of the factors are just briefly outlined. However, it highlighted the most stressful area experienced by African societies due to climate change. Climate change makes societies vulnerable on multiple levels. This is even more strengthened by other political or economic factors. The mitigation of climate change impacts is not, therefore, easy. All those mentioned above make countries vulnerable and sometimes this vulnerability could result in violence which is the topic of the dissertation and will be discussed below.

2 Conflicts: Inter-, Intra-state, Internal Conflicts, Civil Wars and Others

This work aims to analyse the complexity of the incidence of violent conflicts in sub-Saharan Africa and how vulnerable countries become conflictual. Therefore, first we have to briefly conceptualize terms such as conflict and violence. Unfortunately, finding an easy and parsimonious definition of conflict is hard. Various databases measure conflicts in different ways. While some focus on large-scale conflicts or wars others rather use disaggregate data to discover not just violent but also non-violent conflict events. During the 2000s, researchers turned their eyes to civil wars; now we speak more of inter-communal conflicts.

Conflict is a social phenomenon that is everywhere and could have various results. In its simplest sense, it is the result of a situation of disagreement or "contradiction," which is one of the important dimensions of conflict, as Johan Galtung (1996, p. 71) states. The other two parts of his "triangle" are "attitude/assumptions" and "behaviour". In the event that all three dimensions are supplied, the conflict appears (Galtung, 1996, pp. 71–73). Conflict could be violent, peaceful, or armed. Simply said, conflict could be destructive, but it could also bring development (Galtung, 1996, p. 70). The goal of this chapter is to review diverse typologies and terminological debates on various types of conflicts in International Relations and Security Studies. It is not the goal of this chapter to redefine the conceptual and operational definitions; however, it is important to discuss the differences between minor conflicts and civil wars or inter-communal conflicts and other possible types before we can move on to additional parts of the work.

In general, we can differentiate between conflicts in several ways by actors, goals, objectives, causes, or intensity. Various terminologies sometimes bring a lot of problems for example, under the term civil war, many people can understand different things as it is a "subjective concept" (Canestaro, 2016, p. 359). Clear definitions are therefore very important in the case of Security Studies and International Relations.

One of the most known typologies that set the basic definitional criteria for war and probably stood at the beginnings of the quantitative research of conflicts is Correlates of War (COW), the project started by Mel Small and David Singer. It is important to mention that COW, as the name tells us, focuses particularly on wars. Originally, the database

started with three types of wars: inter-state, civil wars and extra-systemic (Small & Singer, 1982, cited in Sarkees, Wayman & Singer, 2003, p. 58). However, later they reworked the typology. Although the three main types survived, the whole typology changed slightly as extra-systemic, newly extra-state, represent an independent category while before it used to be international wars. On the other hand, civil wars were sorted under the category of intra-state wars alongside inter-communal wars (Sarkees, Wayman & Singer, 2003, pp. 59–60). In the latest version, however, COW added a totally new category of non-state wars which in the end led to altogether nine types of war (Sarkees, n.d.). However, this typology could be criticized on various levels (Baev, 2007; Sambanis, 2004; Canestaro, 2016). One of the main reasons is that it settled the generally accepted definition of war (and also civil war) which after several changes over time ended as: "sustained combat, involving organized armed forces, resulting in a minimum of 1,000 battle-related fatalities (later specified as 1,000 battle-related fatalities within a twelve month period)" (Sarkees, n.d, p. 1). Obviously, the main criticism is quite clear, the focus of the definition is on war for which the threshold is set as arbitrary. This is also highlighted by Nicolas Sambanis (2004) in his seminal work on civil wars. However, even he aptly points to the fact that "ad hoc coding rules" are necessary (2004, p. 816). The focus on 1,000 battle-related deaths leads us to a fuzzy estimation on the basis of unprecise data (Canestaro, 2016, pp. 362–364; Baev, 2007, pp. 258). Even though Sambanis is clear about this problem, he later also includes battle-related deaths as he proposes his own 11 operational criteria for civil wars (2004, pp. 829–831).

This raises the question of the utility of a single focus on civil wars which have been in the past years in the spotlight. It is questionable whether to use a definition that is not dependent on the numerical account. The proposal of a rather constructivist focus on cases that are called war by actors would seem to be more plausible, even though the comparability would probably be problematic. This way of definition and operationalisation is used by Nathan Canestaro (2016). Canestaro (2016) instead of a scientific-operational definition, focuses on practitioners. His definition is simple and also offers the possibility of quantification as it focuses both on actors' "recognition" of the events or on "both the mobilization and organization requirements" (Canestaro, 2016, pp. 373). In general, in civil war, rebels have to be a clear challenge to the state and its sovereignty, and the whole conflict has to be big enough to be recognised (Ibid., pp. 372–

373). Obviously, this definition requires deep knowledge of each case, but this knowledge should always be present before we acknowledge any conflict as war or civil war, particularly due to the strength the "label" has (Canestaro, 2016, p. 366). Kalyvas (2006, p. 17) for example defines civil war in very broad terms as "armed combat within the boundaries of a recognised sovereign entity between parties subject to a common authority at the outset of the hostilities." Therefore, he also refuses to use any intensity and thus he is closer to what could be called "internal war" (Ibid.). Even though the labelling of conflict as war/civil war is important, the intensity-based typology is always problematised mainly due to incomplete data, which could even be truer in the case of Africa.

If we take a look at probably two of the biggest projects nowadays focusing on conflicts and violence, we will realise that there is less focus on intensity and their typology is rather based on actors or the goals of conflicts. The Uppsala Conflict Data Programme (UCDP) also recently responded to changes in the focus of conflict research and offers many different versions of dataset. In the dataset on "Armed Conflicts" it still preserves its focus on the armed character of conflicts and violence with its threshold of at least "25 fatalities in calendar year," however today it is not only state-centric as it broadens its focus to three categories of "organized violence" – "state-based armed conflict, non-state conflict and one-sided violence" (Davies, Pettersson & Öberg, 2022, p. 1). While now the UCDP collects data on "organized violence" in its previous version, it mainly focused only on the first category of state-based armed conflicts that was defined as

> a contested incompatibility that concerns government or territory or both, where the use of armed force between two parties results in at least 25 battle-related deaths in a calendar year. Of these two parties, at least one has to be the government of a state. (Themnér & Wallensteen, 2014, p. 541)

This definition also remains strong in the latest version of the dataset with three categorisations according to intensity (minor and war), type of incompatibility (territorial or/and governmental disputes), and conflict sides participating in conflict (extrasystemic, interstate, intrastate, internationalised intrastate) (Pettersson, 2022). The other two types

of "organized violence" rather do not offer further categorisation (Pettersson, 2022a; Pettersson, 2022b).[24]

This dataset of UCDP could obviously be criticised on the similar basis as COW. Although its inclusion rules are not so exclusive as it focusses on more general event of "political violence", the threshold of 25 deaths could still lead to some kind of exclusion. However, the "Georeferenced Event Dataset" of UCDP (Sundberg & Melander, 2013; Davies, Pettersson & Öberg, 2022) is even more inclusive. It focuses on the event of "organized violence" that is "[a]n incident where armed force was used by an organised actor against another organized actor, or against civilians, resulting in at least 1 direct death at a specific location and a specific date" (Högbladh, 2022, p. 4). This means that even the smallest events of organized violence are included, however, even here it is necessary to observe at least one fatality.

A similar and even more inclusive database is the Armed Conflict Location & Event Data Project (ACLED). It does not use any threshold for inclusion (ACLED, 2019). The database reacts to the problem of exclusivity of previously mentioned databases and focuses on a deeper knowledge of conflicts that could be outside the focus on wars or bigger conflicts (Raleigh et al., 2010). Currently, the database enables researchers to work with three types of general events, which could be further differentiated into six categories and 25 subcategories according to the character of events. Similarly, it makes the differentiation of conflict events possible according to actors and their dyadic relations (Raleigh et al. 2010; ACLED, 2019). Rather than on wars, armed conflicts, or "organized violence", ACLED focusses on "political violence" which is defined as "the use of force by a group with a political purpose or motivation" (ACLED, 2019, p. 6). ACLED comes closer to the previously mentioned definition by category of "battles" which are one of the "violent events" and are defined as "a violent interaction between two politically organized armed groups at a particular time and location" (Ibid., p. 7).[25]

[24] Obviously, as a database offers data on fatalities or other variables further differentiation is possible (Pettersson, 2022a; Pettersson, 2022b)

[25] ACLED (2019; Raleigh et al., 2010) goes even further as it also provides data on demonstrations and non-violent actions which is far more general than any other database. However, it is also far from the research goal of this thesis.

We have already touched on several different terms. Civil war has been discussed above. As the thesis focuses mainly on internal conflicts, it is important to define this term. In this thesis, this term is understood as a synonym to intra-state conflicts. While UCDP for example exclusively uses the term intra-state (Pettersson, 2022), COW rather uses internal and intra-state as synonyms (Sarkees, n.d.). As for the goal of this thesis, intensity is not of such importance; therefore, this thesis does not differentiate between wars and minor conflicts. The reason is also the above-mentioned problem of estimated fatalities. As the focus of the third and fourth research questions is rather on the causal differences of conflicts of different actors (government, rebels, and communities), the terminological focus is on violent civil conflicts and violent inter-communal conflicts. Even though the operationalization will be debated in chapter 5.3, it is important to mention already here that the understanding of a violent civil conflict and a violent inter-communal conflict is based on the database ACLED (2019). The definition of a violent civil conflict here is close to the above-mentioned civil war definition of Kalyvas (2006). As based on ACLED (2019; Raleigh et al., 2010) definitions, a violent civil conflict is defined as the event of battles between government state forces and rebels (with possible outside intervention) and an inter-communal violent conflict as battles between two communal militias. Therefore, it is linked to what ACLED (2019, pp. 25–26) calls inter-communal violence and civil war violence. A decision was made deliberately not to use the term civil war but rather violent civil conflict to prevent an unintentional expectation that a very intense conflict is being spoken about. What the focus in this case has in common is the characteristic challenge of rebels to government and the sovereignty of the state.

Throughout the thesis, various authors and their research use other different terms, such as, for example, political violence. In this regard, an attempt is always made to preserve the original term the authors use to make sure that their conclusions are not misunderstood. However, specifically in the case of political violence, some understand it as mutually interchangeable with conflict, while others see it as characteristic of conflicts. If it is not written differently, political violence is understood as violent conflict even though it is accepted that political violence could also take other different forms as it is significantly visible in the ACLED database (2019).

3 What is Behind Internal Conflicts? – The Debate without an End

The debate on the conditions under which conflicts occur is one of the most traditional in Political Science and International Relations. From some point of view, it could be said that the question "what stands behind conflicts and wars?" was there right from the beginning. The same could be said about studying conflicts and mainly internal conflicts in Africa. The debate and empirical results are not united and still we can find those who rather support the greed argument and those who favour the grievance (for a review, see Blattman & Miguel, 2010; Cederman & Vogt, 2017; Le Billon, 2009; Sambanis, 2002; Dixon, 2009). It is important to mention that many of this debate are actually on civil wars or major internal conflicts. This is connected to the most frequently used operationalisation and conceptualization mentioned in previous sections.

The current debate focusses mainly on three persistent general points of view. That is the debate between greed, grievance, and weak state schools. The goal of this chapter is to debate current theoretical and empirical knowledge on the topic of conflicts, with a particular focus on the impact of the issue of climate change and environmental scarcity and present review of current knowledge on the topic

3.1 Greed, Grievance, Opportunity and Weak State Framework

From a most general point of view, some authors differentiate among three types of logic in the case of conflicts or more likely civil wars: 1. Grievance (Ted Gurr), 2. Greed (Paul Collier and Anke Hoeffler), 3. Opportunity (James Fearon and David Laitin) (Cederman & Vogt, 2017, pp. 1995–1996).[26] This chapter follows this division and presents three different types of logic that stand behind conflicts. Later, the empirical proof of the various arguments and variables.

The first is mainly related to the work of Ted Gurr (1970) and his introduction of "relative deprivation" and attempt to explain political violence with use of it. He defines it as

[26] Wimmer, Cederman and Min (2009, p. 318) differentiate between two schools of civil war logic – greed-opportunity and diversity-breeds-conflict. They draw a line on the basis of how diverse scholars accept the importance of ethnic grievances. It is important to say that Collier and Hoeffler (2004, p. 589) state that "[o]pportunity as an explanation of conflict risk is consistent interpretation of rebellion as greed."

> […] actors' perception of discrepancy between their value expectations and their value capabilities. Value expectations are the goods and conditions of life to which people believe they are rightfully entitled. Value capabilities are the goods and conditions they think they are capable of getting and keeping. (Ibid., p. 24)

In his understanding, deprivation could arise in three different ways: Decremental, Aspirational and Progressive (Ibid., 46). In general, we can define them in the way of interplay between what is expected and what can be done. While in the first case of deprivation, the first remains the same and the second drops, in the second case it is other way around (Ibid.). The first situation is similar to today's climate change and resource scarcity that worsens the situation even if the expectation could stay the same as before. The whole mechanism of climate change and resource scarcity will be discussed further in a thesis. The last way, Progressive deprivation, is a specific situation where "there is substantial and simultaneous increase in expectations and decrease in capabilities" (Ibid., p. 46). The last way of deprivation could be interpreted also as an example of the influence of climate change on people. Climate change in this situation could be seen as the dividing line between those who can benefit from modernization, adaptation, or development of the country and those who are greatly hit by climate change and therefore are the "losers" of modernization, adaptation, or, more generally transformation.

In the grievance model, therefore, people are rebelling or fighting because of the injustice they perceive. This injustice could be based on political, cultural, or economic means, such as unequal access to power or economic inequality (Gurr & Moore, 1997, pp. 1081–1084; Stewart, 2008, p. 3). According to Francis Stewart, one of the main proponents of the grievance position, it is a more "group mobilisation" which is possible only in the situation of "serious grievances at both leadership and mass level" (Stewart, 2008, p. 12). Those grievances are based on what she calls "horizontal inequalities" – that are "inequalities between culturally defined groups or groups with shared identities" (Ibid.). Therefore, in her view, grievance is based on perceived injustice or inequality in different spheres on the group level, which makes her analytical framework different from Collier and Hoeffler (Stewart, 2008).

In the late 1990s and early 2000s, Paul Collier and Anke Hoeffler (1998; 2004; with Rohner, 2009) published a series of articles in which they develop an econometric model in which they argue for greed model. Later, they moved their model (C-H model) more in the direction of "feasibility" (Collier, Hoeffler & Rohner, 2009). According to Collier and Hoeffler (2004, pp. 564–565), two main types of logic, grievance-based and greed-based, are mutually exclusive. In their model, they decline grievances as important for rebellions. In this regard, they follow some other scholars who criticised Gurr earlier (Cederman & Vogt, 2017, p. 1996). Only grievance-based proxy that seems to be important is what they call "ethnic dominance" (Collier & Hoeffler, 2004, p. 288). Grievances are therefore, according to the C-H model just a *red herring* (Cederman & Vogt, 2017, p. 1996). To their conclusion, Laurie Nathan (2008, pp. 264–270) argues that they make several mistakes in choosing and interpreting variables and proxies they use. According to him, some of the proxies and variables could be interpreted not just in the way of greed, but also as grievance-based (Ibid.).

In the article with Dominic Rohner (2009), they decided to move from greed-based causes to the "feasibility" argument. They argue "that where a rebellion is feasible it will occur" (Collier, Hoeffler & Rohner, 2009, p. 24). Therefore, they separate the motivations of rebels and the conditions under which conflicts appear. In their conclusion, they again argue mostly against grievances and support their previous findings of greed with feasibility, which is according to them more important than motivation (Ibid.).

The C-H model was not without any criticism; in fact, it was just the opposite. David Keen[27] (2012) criticises the C-H model in three ways: 1. "the impression – sometimes ill-founded – of 'newness'"; 2. It is shallow and prefers simplicity over complexity; 3. It has dangerous political implications (Ibid., p. 578). Similarly, this is close to Nathan's (2008) arguments mentioned above. Definitely, we can agree that some of the arguments made by Collier and Hoeffler (1998; 2004) and later by Collier, Hoeffler and Rohner (2009) are too simple for such complex phenomena as civil war or more general conflicts. We can agree with Nathan (2008, p. 265) that, for example, repression also falls under a different framework than just grievance proxy or that in case of several

[27] It is interesting that David Keen (2012, pp. 757–758) points to a fact that he is more a proponent of the greed-based argument.

variables Collier and Hoeffler use wrong proxies. The point about inappropriate operationalisation is also made by Keen (2002, pp. 761–762). What is also important to mention is the way the results are made. As Keen (2012, p. 761) notes, the C-H model looks strong also because of the use of data and quantitative model. This is also criticised by Nathan (2004, p. 266) who points out that Collier and Hoeffler make a mistake in their approach and therefore their conclusion is "speculative".[28]

Opportunity logic is based, according to Cederman and Vogt (2017), on a work by James Fearon and David Laitin (2003). Actually, Collier and Hoeffler in their first article also use the term "opportunity" (Collier & Hoeffler, 1998). Their main argument is built on consideration of possible costs and gains in a rebellion (Ibid., p. 567). Fearon and Laitin (2003, p. 88) aptly mention that the way decolonisation made the state fragile and weak leads to conflicts. They focus mainly on the state institutions and its stability. Therefore, their argument is close to what Richard Jackson (2002) called a weak state framework. Jackson (2002, p. 38) connects his point of view to authors like who highlighted the political processes and strength of the state structures as important for internal conflicts in Africa. The topic of the weak state or failed state is not new, of course, in Africanist literature.

Very often authors put different adjectives in front of state when talking about Africa. The reason why they use adjectives like failed or weak to African state is in its history of emergence as an unprepared successor to colonial rule (Zartman, 1995, p. 1). The weak state notion is based on the Weberian understanding of the state. This is why authors like Joel Migdal (1988, p. 19) start with this notion and focus on the capacity of a state, which means that a strong state is able to "penetrate society, regulate social relationships, extract resources and appropriate or use resources in determined ways", and the weak state is the opposite (Migdal, 1988, p. 4–5). William Reno uses several different terms. The weak state then is used for the situation where "a spectrum of conventional bureaucratic state capabilities that exists alongside (generally very strong) informal political networks" (Reno, 1998, p. 2).[29]

[28] He mentions, for example, the way Collier and Hoeffler come to the conclusion about resource curse or a rejection of grievance argument (Nathan, 2004, pp. 267–270).

[29] For a review of different approaches to weak states, see Lambrecht (2017).

From the point of view of a weak state framework, it is important to distinguish between failed and collapsed states, too. William Zartman (1995, p. 5) uses the term collapsed state for the state that fails to fulfil the basic function of the state as it does not provide a response to the needs of its people, nor is it able to generally control them. A prominent author on the topic, Robert Rotberg, distinguishes between strong and weak states (a weak state could further become failed, and collapsed states) (Rotberg, 2004).[30] A failing or failed state is then the state that is not able to fully control its territory and does not have a monopoly of the violence that leads to a rise of violence and crime (Rotberg, 2004, p. 5–6). His typology is generally criticised for a blurry delimitation of the difference between failed and collapsed state (Šmíd & Vaďura, 2009, p. 46).

Another term – *quasi-state* – is based on two basic proprieties of state – internal and external sovereignty (Kolstø, 2006, p. 724). For Kolstø (2006, p. 725) the quasi-state is reserved "for states without external sovereignty." Therefore, the failed state is a state without internal sovereignty but internationally acknowledge (Kolstø, 2006, p. 725). Tomáš Šmíd and Vladimír Vaďura (2009, p. 48) evaluate the whole discussion about failed states as clearly confusing, as they also highlight the other terms used for the same situation.

There are several important points that are criticized. One of the most important things is a normative identification of failed or fragile states as some "disease" (Call, 2010, p. 303). Some postcolonial critics see it as part of "Western universalism" where the western model is the normative standard compared deviant *Other* (Hill, 2005). The second important factor that is often criticised is the whole confusion about terminology. We have mentioned just the tip of the iceberg in terminology as many other adjectives are used (Šmíd & Vaďura, 2009, pp. 47–48; Klute, 2013, p. 4). Last but not least, some authors argue that it is not analytically useful with the Weberian notion it has in its basis (Chabal & Daloz, 1999). Nowadays, Africanists conceptualise state and its functionality in different terms (Klute, 2013; Hüsken, & Klute, 2015; Bøås & Strazzari, 2020, Schmiedl, 2019a). Conceptually, we can see the states in Africa as they have a "hybrid character" which means that state politics cohabitate with "different types of patrimonial

[30] Based on this typology there is a Fragile state index (formally Failed state index) produced by Fund for Peace (Fund for Peace, 2017). The Index is highly criticized by the academic sphere as with its high impact it is linked with normativity as also west-centrism (Šmíd & Vaďura, 2009, p. 60).

and ‘Big Man’ politics” (Bøås & Strazzari, 2020, p. 3). This character of state is obviously a great opportunity for diverse groups to challenge the “central” authority. However, this does not mean that this character is a necessary cause of instability (Bøås & Strazzari, 2020). Therefore, state functionality clearly is important in analysis of conflicts in Africa, however, we have to approach it critically.

Often, we see conflicts as part of the “weak state”, however we can agree with Bøås and Strazzari (2020) that it is hardly the cause. This is in the opposition to Jackson (2002, p. 44) who sees internal conflicts as a result of this specific feature. He proposes that specific features of a weak state and the way they are governed are “underlying” and “proximate” causes. In this framework, he turns to political, institutional but also social structures like ethnic cleavages, patrimonialism or a level of democracy and the way elites deal with it (Ibid., p. 41). Fearon and Laitin (2003, p. 88) refuse grievance in the same manner as Collier and Hoeffler and they point to the fact that “state weakness marked by poverty, a large population, and instability” is what makes a state prone to conflicts. In case of Bøås and Strazzari (2020), however, the character of the state is not the cause of the conflicts but rather the operational space.

Now let us take a look at empirical knowledge about some main variables mentioned in general conflict theories. The next subchapter will briefly discuss various conditions and proxies used in the most influential works. Some of the arguments will be broken down into diverse proxies, like the weak state that consists of diverse economic but also political proxies.

3.1.1 Democracy, Instability, Poverty and Weak State

Democracy is one of the longest-standing variables in conflict research. The reasons lie in the argument that the problem-solving approach of democracies better manages problems in society (Koubi et al., 2012, pp. 114, 116; Hegre, 2014, p. 162). Democracy should be more peaceful, but this does not mean that autocracies are not. There is considerable support for the “inverted U-shape curve” connection between conflicts and the level of democracy (Hegre et al., 2001, pp. 33–34). The shape of the relationship seems to be important. For example, even though Fearon and Laitin (2003) do not find a lack of democracy as a preferable explanation for conflicts and democracy as an obstacle for conflict, they somehow support the semi-democracy-leads-to-conflict hypothesis. It

seems that the relationship is not a simple democracy-peace and autocracy-conflict. The reason is that autocracy can use high repression to stop rebels even before the conflict. This is not possible for semi-democracies that combine some features of democracy and autocracy (Hegre, 2014, p. 163; Buhaug, 2006, p. 696). Most often, the level of the democracy variable is used as one of the measures of grievances. In general, some authors like Collier and Hoeffler (2004; with Rohner, 2009) argue that the level of democracy (as the grievance variable) is not a strong explanatory factor of internal conflicts. On the other hand, others argue that type of institutions, particularly semi-democracies are the types of regimes that are the most prone to civil conflicts while democracies and strong autocracies are quite stable (Hegre et al., 2001; Hegre & Sambanis, 2006; Buhaug, 2006[31]). Therefore, it depends on how scholars operationalise the relationship between the level of democracy and conflicts. Democracy, as a variable, also has an important place in the research of resource scarcity and climate change influence on the incidence of conflicts. Some authors show that institutional background, partially democratic governance, could be important as a mediation tool for managing the climate change influence (Koubi et al., 2012). The argument about anocracies or semi-democracies could lie also in the instability of the institutions of those regimes. There is more agreement among authors about this factor (e.g., Hegre et al. 2001; Fearon and Laitin, 2003; Collier and Hoeffler, 2004; Hegre and Sambanis, 2006; Ide, 2015). The change in regime or recent instability leads to another conflict. Indeed, in the case of semi-democracies, the "inconsistent and contradictory nature of these regimes should prevent them from becoming consolidated" (Hegre et al., 2001, 34).

The recent instability variable is confirmed, for example, by Fearon and Laitin (2003) but also by Collier and Hoeffler (2004, p. 589) who aptly mention that "time heals". In this sense, it is surprising that they find no support for a significant impact of democracy, as it could be expected that democracies are generally stable (Ibid.). Perhaps the reasons lie in the interpretation that Collier and Hoeffler (2004) chose. As Cederman and Vogt (2017, p. 1997) aptly point out: "this account [about semi democracies and conflicts] refers both to the grievance-reducing impact of democracy and to the

[31] Buhaug (2006) argues that the importance of the level of democracy and the shape of relationship towards the incidence of conflict is also dependent on the type of conflict. Interestingly, he points to the fact that in case of separatism "consolidated democracies are most at risk" (Ibid., p. 705)

opportunities for violence." Therefore, Collier and Hoeffler (2004) could be blind to the second possible interpretation.

For some authors, it is exactly instability, weak democracy, and other institutional patterns that characterise the weak state (Jackson, 2001, pp. 38–40). This leads to another set of variables – those around weak state and opportunity logic. According to Fearon and Laitin (2003, p. 88), it is mainly a large population, poverty, and the previously mentioned instability. Poverty, particularly, is probably one of the most strongly supported variables in conflict research. Collier and Hoeffler (1998; 2004; with Rohner, 2009) support importance of poverty, measured as income per capita, in all of their papers. Economic growth seems to be similarly important for stability, and vice versa. Influence of poverty or income per capita is also supported by Fearon and Laitin (2003), Hegre and Sambanis (2006), or Sambanis and Soto (2015). Even though in the case of Fearon and Laitin (2003, p. 88) the interpretation is rather different, as they argue rather for the importance of good governance and a strong state, meanwhile, for Collier and Hoeffler (2004, p. 588–589) it is part of opportunity and greed logic where this variable is important from the point of view of "the cost of rebellion." On the other hand, we can agree with Nathan (2008, p. 265) that poverty as income per capita could also be seen as a grievance.

The population is also an important variable. For Fearon and Laitin (2003, p. 88), it is one of the main precursors of state weakness. Collier and Hoeffler (2004) find it as important for their greed logic of conflict. What is new in the feasibility model is that they check the structure of the population. As they add the proportion of young males in the population as highly significant (Collier, Hoeffler & Rohner, 2009, p. 24).[32] The notion of population size is also supported by Hegre and Sambanis (2006).

As we can see, economic variables and the size of the population seem to be very important. On the other hand, the level of democracy seems to be a rather inconsistent variable in understanding the onset or incidence. As we will see below in the section about

[32] To conclude the whole feasibility logic Collier, Hoeffler and Rohner (2009, p. 24) add the importance of mountain terrain and the French security umbrella. France is important as a peace provider (Ibid., p. 10) on the other hand mountains make it easier to fight for rebels (Ibid., p. 22). Some authors also add other variables that could be connected to the population or physical character of a country like density which does not seems to be significant (Collier & Hoeffler 2004; Collier, Hoeffler, & Rohner, 2009) or area of country (Buhaug, 2006). Buhaug (2006) finds large countries are very prone to regional and secessionist conflicts.

climate change and conflicts, the logic behind climate change seems to be very complex, and therefore the role of those variables could be different.

3.1.2 Resource Curse and Structure of GDP

The resource curse or, more precisely, the oil curse is also one of the most traditional and important variables used in conflict research. It also has its place in Political Ecology, which, as will be shown below, has an important position in the knowledge of the influence of climate change on the incidence and onset of conflicts (Floyd & Matthew, 2013; Le Billon, 2001). While in case of climate change we talk more about scarcity, in the case of the resource curse, it is the abundance of resources. As mentioned, several times by Collier and Hoffler (1998, p. 568; 2004, p. 581) or later with Rohner (2009, p. 12), the structure of GDP is important for the onset of conflicts. Importantly, they argue that the relationship is not linear, but similarly to democracy, it has an inverted U-shape. However, others like Fearon (2005) did not find strong support for the resource curse. He disagrees with the proxy used in the C-H model and rather points to a weak state point of view where it is oil that makes it weak. Cameron Thies (2010),[33] and Sara Mitchell and Thies (2012) rather declined the thesis about the resource curse and primary resources. Indeed, they support the opposite direction of the relationship (Mitchell & Thies, 2012).[34] On the other hand, Michael Ross (2006), Macartan Humphreys (2005) or Ibrahim Elbadawi and Raimundo Soto (2015) support the common notion of the resource curse. However, Humphreys (2005) also rather supports the weak state thesis than a greed-based mechanism. Yu-Hsiang Lei and Guy Michaels (2014, p. 154) find interesting support for the idea that "in countries where political disputes are often resolved by violence (or remain unresolved despite violence), giant oilfield discoveries can fuel the flames of internal conflicts." Their findings are important in two ways: 1. It shows that history matters; 2. It focuses on discoveries of oil, not on oil dependence (Lei and Michaels, 2014). Hegre and Sambanis (2006, p. 533) have some doubts about the resource dependence argument. They argue "oil export and primary commodities dependence to be robustly associated with lower-level armed conflict only and not with civil war,

[33] Thies (2010, p. 321) finds natural resources more likely to strengthen the state than weaken it. In general, he declines the resource curse, except the "oil exporter dummy variable."

[34] Their approach, mainly proxies, is criticized by Hunziker and Cederman (2017, p. 367).

contrary to arguments made by major studies of civil war" (Ibid). Similarly, Buhaug (2006, pp. 705–706) has doubts about the role of oil as he points to the fact that the results depend on the data used in the analyses and that separatist conflicts appear to be more influenced by oil. This is supported in one of the most recent and methodologically advanced studies by Phillipe Hunziker and Lars-Erik Cederman (2017) who find strong support for the influence of the oil curse on separatism and regional conflicts in highly inhabited regions, but they decline this connection to conflicts on the central government.

The argument about resource abundance is more complicated than that presented by Collier and Hoeffler (2004, p. 571). Very often natural resources are presented as possible loot that drives greed (Le Billon, 2001, p. 569; Collier and Hoeffler, 2004, p. 571). The curse of oil or resources is connected to diverse phenomena. It leads to nondemocratic regimes,[35] economic decline,[36] corruption, and conflicts (e.g. Ross, 2015; Ross, 2001; Okpanachi & Andrews, 2012; Sala-i-Martin & Subramanian, 2013; Friedman, 2006; Le Billon, 2001). It is important to note that economic decline and even the quality of a regime is often also connected to conflicts as mentioned before. Therefore, the relationship could be direct, but also indirect. Oil and resources could influence the onset of a conflict through grievances about governance and the level of democracy. Elbadawi and Soto (2015) for example support the role of democracy, or in general good political institutions, in mediating conflict potential natural resources. Specifically, apart from the previously mentioned looting, rebels could also like getting independent revenues. Through the separatism, therefore, they would like to establish their own domain over the resource revenues instead of sending them to the central government (Le Billon, 2001, p. 568). Some authors mention a mechanism that connects resource abundance and resource scarcity, and it is used to explain the violence in the Niger Delta. In their view, oil production is the cause of degradation and pollution that leads to the grievances of fishermen and farmers (Bagaji et al., 2011, p. 37; Hunziker & Cederman,

[35] "Oil impedes democracy" is a classic explanation for some non-democratic regimes and the possibility of their democratization (Ross, 2001; Friedman, 2006). According to Michael Ross (2001, pp. 332–337), there are three mechanisms through which non-democratic regimes are able to sustain the "rentier effect," "modernization effect," and "repression effect."

[36] Economic decline is connected with the so-called Dutch disease. Even though resources or more precisely oil dependence cause economic growth they do not create employment or development. Also, it leads to dependence and rent-seeking that leads to economic decline (Di John, 2010, pp. 2–4; Sala-i-Martin & Subramanian, 2013, pp. 574–575)

2017, p. 368). This could be connected to separatism, as Hunziker and Cederman (2017, pp. 369, 379) call this variation of the oil curse "ethno-regional oil curse." This mechanism is more likely to be connected to the grievances of people living in oil areas. To conclude, according to Ross (2006, pp. 280–282) there are five theoretical causal mechanisms: 1. The greed of rebels who want to capture the whole state; 2. Separatism; 3. Looting of resources; 4. Weak state; 5. An economic decline through "trade shocks." In conclusion, he fully supports the second mechanism and partially the rest of them (Ibid., p. 287–292).

To conclude, there is great discussion about the role of resources or the oil curse in connection to conflicts (for review, see, Koubi et al., 2014). However, as other variables, it suffers from some issues such as the availability of data, the choice of natural resources or the level of analysis (Koubi et al., 2014, pp. 234–239; Ross, 2015, pp. 241–243; Hunziker & Cederman, 2017, p. 366). It depends on which proxy is used and what kind of relationship is expected. Also, the final interpretation and logic seem to be highly discussed.

3.1.3 Identity and Inequality

The last set of variables is often taken as grievance proxies (cf. Collier & Hoeffler, 1998, 2004; Collier, Hoeffler, & Rohner, 2009; Fearon & Laitin 2003; Hegre & Sambanis, 2006). Especially, ethnicity and religion are very problematic concepts and often lead to misunderstandings. Some authors connect them together while some others check their influence separately (Reynal-Querol, 2002; Wimmer, Cederman, & Min, 2009; Bormann, Cederman & Vogt, 2017; Collier, Hoeffler, and Rohner, 2009). The problem is that both are part of identity and often overlap (Bormann, Cederman, and Vogt, 2017, pp. 745). Ethnicity has such a prominent place among other variables that some do research specifically on ethnic civil wars (Gurr & Moore, 1997; Gurr, 2000, 1993; Horowitz, 2001; Stewart, 2009; Wimmer, Cederman, & Min 2009; Bormann, Cederman & Vogt, 2017).

Why is that? What do we mean by them and how can we relate them to conflicts? Ethnicity and ethnic group are not easy to define.[37] There is some kind of exclusion and inclusion that emerge from interactions (Eriksen, 2002, pp. 12–13). Thomas Hylland

[37] In general, there are three approaches to study of ethnicity: Primordial, Instrumental and Constructivist (Gurr, 2000, p. 4)

Eriksen (2002, p. 12), one of the most famous social anthropologists, defines ethnicity as "an aspect of the social relationship between agents who consider themselves as culturally distinctive from members of other groups with whom they have a minimum of regular interaction." An ethnic group could be defined as "people who share a distinctive and enduring collective identity based on a belief in common descent and on shared experiences and cultural traits" (Gurr, 2000, p. 5).[38] Similar definition is used by Wimmer, Cederman and Min (2009, p. 325) when they refer to a "sense of commonality based on a belief in common ancestry and shared culture." However, what is culturally distinctive? What makes that myth? How do we know what this culture is and how do we relate to ancestry? Samuel Huntington (1993) in his famous but often very criticised thesis about the clash of civilizations defines culture by religion. However, religion could be just one of the dimensions of ethnic identity. For example, Nils-Christian Bormann, Lars-Erik Cederman, and Manuel Vogt (2017, p. 751) explore ethnicity as "multidimensional" with a distinctive religious and linguistic feature. Donald Horowitz (2001, pp. 17–18) points to the fact that in case of ethnicity, "groups are defined by ascriptive differences, whether the indicium of group identity is color, appearance, language, religion, some other indicators of common origin, or some combination thereof." However, distinction could be made on diverse foundations. In the case of the study of conflicts, linguistic and religious distinction is very often studied, as both are taken as permanent and more or less visible. Some argue it is religion that makes the main distinction (Huntington, 1993; Reynal-Querol, 2002), others argue it is more likely language (Bormann, Cederman, & Vogt, 2017) and some combine both in one index for their research (Collier, Hoeffler, & Rohner, 2009).

Some of the characteristics are more permanent, some less. For example, Martha Reynal-Querol (2002) builds on the Huntington civilisation thesis and proposes that religious differences are highly permanent and divisive. In conclusion, she supports that religion is much more important for ethnic conflicts than languages. This is heavily challenged by Bormann, Cederman and Vogt (2017) who with the use of newer data and a more advanced approach, support the opposite conclusion. According to their conclusion, it is also inequality that makes a difference. Power relations and the position

[38] Gurr (2000, p. 5) also identifies "Ethnopolitical groups" that differentiate in political use of ethnic identity.

of the group seem to matter in case of ethnic conflicts (Ibid., p. 759). These two papers focus, particularly, on ethnic conflicts. It is different in general studies of conflicts. Fearon and Laitin (2003) find no support for ethnicity or religion in the case of conflict onset. The same is true for Hegre and Sambanis (2006, p. 529) with the exception of small conflicts. Surprisingly, according to Collier and Hoeffler (1998; 2004; with Rohner, 2009), ethnicity is only grievance proxy that works. In the first paper, they build on a more ethno-linguistic measurement and find that a society divided into two groups is most prone to conflict (Collier & Hoeffler, 1998). Later, they changed their conclusion and support the so-called "ethnic dominance" while religion is not significant (Collier & Hoeffler, 2004, p. 588). In their last research, they again changed the use of the combined (ethnicity and religion) index of "social fractionalisation" and showed that it leads to conflict (Collier, Hoeffler, & Rohner, 2009, p. 14).

Of course, Gurr (1993) in his study shows that identity and inequality matter and support the grievance model. With the use of "Ethnic Power Relations" data, Andreas Wimmer, Lars-Erik Cederman and Brian Min (2009) show that ethnicity matters in case of ethnic exclusion, executive rivalry based on ethnicity or the history of rule. Furthermore, as criticised by Wimmer, Cederman and Min (2009, pp. 318-319), the indicators used in the C-H study are not useful because they do not capture relations between groups. This is also what Stewart's (2008) model of "horizontal inequality" is built upon. In her point of view, this kind of inequality could be in various spheres of political and social life. In the end, it is this pattern of relation that "predispose countries to violent conflict" (Stewart, Brown, & Langer 2008, p. 301)

The type of relationship between groups is therefore significant. Inequality and power relations make ethnicity important (Wimmer, Cederman, & Min 2009, p. 319; Stewart, 2009, p. 7). It is marginalisation and access to power that politicise ethnicity and group identity. In this sense, it could be important to know whether the relations between different groups overlap with the class relations. This is what Horowitz (2001, p. 22) calls "hierarchical ordering" and "parallel ordering." Simply said, in the first system, ethnic relations copy social stratification in the second system not (Ibid.). Power relations and marginalisation are also very important from the point of view of climate change and resource scarcity, as we will see below. This argument is very important for Political Ecology and its understanding of relations.

3.2 Climate Change, Environmental Change and Conflicts: A Discussion between Environmental Security and Political Ecology

Before we can get to the framework used in this work, first we need to add the last piece of the conflict puzzle – Climate change, Environmental change and resource scarcity. Discussion on the impact of climate change on the incidence and onset of conflicts, or in general, the role of environment in conflicts, was heavily established during the 1990s (e.g., Homer-Dixon, 1994, 1999; Baechler, 1999).[39] Some even talk about climate change and global warming research as a "paradigm" (Peet, Robbins, & Watts, 2011, p. 1). Today there is a large amount of literature dealing with this topic (see Burke et al., 2009; Raleigh, 2010; von Uexkull, 2014; Fjelde & von Uexkull, 2012; for a review or concluding work, Nordås & Gleditsch, 2007; Buhaug, 2015, 2016; Koubi, 2019). As mentioned in the introduction, research on the impact of climate change on conflicts is mainly connected with research on resource scarcity and environmental security (Floyd & Matthew, 2013, p. 10). In general, the arguments about climate change and the incidence of conflicts are simple. They presume that growing temperatures and changes in rain precipitation that place the population under stress will lead to conflict (Theisen, 2008, p. 803). Therefore, there is an expectation about the inter-connection between the environment and society.

The entire environmental system is closely interconnected. For example, even a small change in rain precipitation and higher temperatures influence soil degradation and access to land or water sources. The requirement of new land could lead to deforestation, which in turn could influence biodiversity or rain precipitation, again negatively influencing agriculture (Homer-Dixon, 1994, pp. 7–8; Homer-Dixon, 1999, pp. 40–41; Robbins, 2012, p. 160). Therefore, the climate-change-induces-conflicts argument is basically built on resource scarcity. In this sense, even a small change in climate could lead to deprivation, which could be the example mainly in countries that are dependent on agriculture (Raleigh & Kniveton, 2012, p. 52). Consequently, the entire argument about the influence of climate change on the incidence of conflict is mostly based on a

[39] Environmental Security and environmental determinism was also highly popularized in column *The Coming Anarchy* by Robert Kaplan (1994) which is criticized by for example Nancy Peluso and Michael Watts (2001, 3–7) or Simon Dalby (2002, 29–40). His dark picture presents Africa as a future violent continent mainly due to such issues as the growing population, deforestation and land degradation and is the clear example of pure environmental determinism (Kaplan, 1994).

problem with the reduced number of renewable sources (ibid, p. 51). Therefore, the arguments about climate change are heavily connected with Environmental Security and resource scarcity.

According to Theisen (2008, p. 804), the argument of Environmental Security, with its focus on scarcity and resources that people access, is connected to grievances and the works of Ted Gurr (see previous chapter). However, Eco-scarcity[40] is just one of many schools that focus on the occurrence of conflicts and climate change. The other main school is Political Ecology.[41] Although both theories are closely related, they have some differences (Floyd & Matthew 2013, p. 7).

The main proponents of Environmental Security have been for a long time Thomas Homer-Dixon with his series of articles (1991; 1994; with Boutwell & Rathjens, 1993) and books (1999; with Blitt, 1998), and Günther Baechler (1999).[42] According to Ole Theisen (2008, p. 803), the Eco-scarcity argument heavily builds on the Malthusian and neo-Malthusian thesis.[43] Thomas R. Malthus (2001[1798]) in his famous book *An Essay on the Principle of Population* presents a dark vision of the future where the resources are not enough to satisfy population needs. As he argues: "Population, when unchecked, increases in a geometrical ratio. Subsistence increases only in an arithmetical ratio. A slight acquaintance with numbers will shew the immensity of the first power in comparison of the second" (Malthus, 2011[1798], p. 11). Although Theisen is right in his

[40] In this thesis, the term Eco-scarcity is used as a synonym to Environmental Security

[41] Rita Floyd and Richard Matthew (2013, pp. 6–10) differentiate among several schools that deal with environmental change. For example, human security, feminist environmental security or environmental peacebuilding etc. In this thesis, the focus is mainly on the resource scarcity and political ecology argument with a connection to climate change. This, of course, does not mean that some of the arguments are close to other schools as for example the resource curse whose argument is deeply a part of the research of conflicts mentioned in the previous chapter.

[42] Both of them, Homer-Dixon and Baechler were in charge of research groups. Baechler in Switzerland and Homer-Dixon in Canada. The third research group was around Nils Gleditch in PRIO, Norway (Peluso & Watts 2001, p. 12).

[43] The Malthusian thesis about negative impact of population growth and the limits of living subsistence has also been mentioned by Paul Ehrlich's (1988) book *Population Bomb.* Similarly the book *The Limits of Growth* by Donella Meadows et al. (1972) which builds on *the Project on the Predicament of Mankind of the Club of Rome* and that warns about the population growth and final amount of resources. As they conclude: "the limits to growth on this planet will be reached sometime within the next one hundred years." (Ibid., p. 23).

argument, Homer-Dixon (1999, 40) actually builds not just on neo-Malthusian,[44] but also on a group of scholars that he calls "economic optimists"[45,46] and the third orientation for which he uses the name "distributionists"[47] (Ibid, pp. 28–29). As he aptly points out: "None of these three camps, I [Homer-Dixon] believe, fully recognizes a particularly important implication of the scientists' findings" (Ibid, p. 42). It could be said that he combines the idea of ingenuity from economic optimists, the population grows, and the scarcity of renewable resources from neo-Malthusian and structural-induced scarcity from distributionists (Ibid., p. 43). To conclude the whole argument of Homer-Dixon, it combines all three orientations of research on environmental scarcity.

One of the main mechanisms in the case of the study of climate change and conflicts is built on the argument of scarcity. The main driver in this sense is the growing population and the final number of renewable resources (Raleigh, 2010, pp. 71–72). The scarcity according to Homer-Dixon (1999, p. 48) could be framed in three ways as "supply-induced, demand-induced, and structural-induced scarcity." The first is based on "decrease in total resource supply"; the second is connected to "a rapidly growing population" and, therefore, growing needs of the societies; the last one is connected to an "imbalance in the distribution of wealth and power" resulting in the scarcity of some groups (Homer-Dixon, 1999, p. 15). Thus, the last source of scarcity is not far away from what is highlighted by Political Ecology as we will see below. In this way, we can interpret the influence of climate change. At some point, climate change could influence conflicts. It could reduce sources for a growing population and it could also influence the distribution of wealth and power in society, as clearly some parts of society in situation of limited resources will be marginalised in those terms.

An important part of the framework of Environmental Security in the case of Homer-Dixon (1994, p. 16; 1999, p. 25) is ingenuity and adaptability. This point follows

[44] Neo-Malthusians are pessimists that build on expectation of a growing population and final or even reducing number of resources (Homer-Dixon, 1999, pp. 29–30).

[45] Economic or market "optimists" expect the reaction of the market that adjusts the distribution or production and helps to overcome the scarcity (Homer-Dixon, 1999, pp. 31–32; Robbins, 2012, pp. 16–17).

[46] Other authors use the term "Cornucopian" (Bretthauer, 2015, p. 594; Koubi et al., 2012)

[47] "Distributionists" focus more on social and structural inequality. Therefore, the main reasons for scarcity are "inequalities in the distribution of wealth and power" (Homer-Dixon, 1999, p. 35).

up on the Cornucopians or economic optimists. There is a supposition that humans can overcome hardship and environmental changes and scarcity and thus prevent conflicts (Bretthauer, 2015, 598). Indeed, scarcity could provoke a social and technical adaptation that helps stop the shortage. Unfortunately, not all societies have the same possibilities for this adaptation due to different levels of poverty, human capital, or know-how (Homer-Dixon, 1999, pp. 107–122; Homer-Dixon, 1994, p. 17). This argument is striking when we take into account the situation in African countries. Many of them are among the poorest countries in the world. Therefore, their possible adaptability is limited. This goes also with other factors that influence the possible adaptation of countries. Homer-Dixon (1999, p. 116) points to "market failure, social friction, shortage of capital, and constraints on science." All of these factors are significantly problematic in African states and have an important impact on the sources of possible failure of adaptation in Africa.

Even though scarcity is a primary variable for Environmental Security, it is also contextual. Homer-Dixon and Blitt (1998) aptly point out that

> [t]he relationship between environmental scarcity and violence is invariably complex. Scarcity interacts with such contextual factors as the character of the economic system, levels of education, ethnic cleavages, class divisions, technological and infrastructural capacity, and the legitimacy of the political regime. (p. 224)

Despite this fact, according to Clionadh Raleigh (2010, 72) or Matthew Turner (2004, p. 865), these political, structural, institutional, or contextual factors are marginalised in Environmental Security. Therefore, the main argument of Environmental Security according to some authors is that "resource-related conflict (violent or nonviolent) stems from a physical or socially-produced scarcity of natural resources" (Ibid) which stems from the focus on population growth (Peluso & Watts, 2001, p. 13). Even though Homer-Dixon (1999, p. 178) highlights the role of political, economic and other conditions, political ecologists heavily criticized him and Environmental Security in general for putting too much stress on resource-scarcity (Peluso & Watts, 2001; Raleigh, 2010; Turner, 2004).

Political Ecology is a growing school or even maybe epistemological position that is among the main critics of the resource scarcity argument (for a review of the criticism,

see Bretthauer, 2017). In the simplest way, Political Ecology aims to get politics back into the study of the environment (Le Billon, 2001, p. 563; Robbins, 2012, p. 14; Floyd & Matthew, 2013, p. 8). In general, it blames Environmental Security for ignoring the local but also global contexts, thus not providing the full image. As Paul Robbins (2012) points out:

> […]it posits the environment as a finite source of basic unchanging and essential elements, which set absolute limits for human action. However intuitive (divide a limited stock of earth materials by a potentially infinite hungry human population and the result always approaches zero), this assumption has proved historically false and conceptually flawed. (p. 16)

Similar to Environmental Security, Political Ecology is not new. Most often the roots are found in the 1960s and 1970s when the first clear thesis was formulated (Peet, Robbins, & Watts, 2011, p. 24; Neumann, 2005, p. 21). One of the main foundations of political Ecology is in the works of Karl Marx as many of the authors refer to the Marxist political economy that brought a possible explanation to the events and provide a space for the criticism of other schools, for example, cultural ecology or the approach of natural hazards, and approaches that stood at the beginnings of Political Ecology (Watts, 2013, p. 87; Neumann, 2005, pp. 17–25).[48] The inspiration by the Marxist political economy was mainly in the influence of capitalism, capital accumulation, class relationship, and policies on environmental issues (Peet, Robbins, & Watts, 2011, pp. 24–26; Neumann, 2005, p. 42). The Marx ideas of "alienation" and "exploitation," the relation between production and consumption or social injustice, echoes in some of the understandings of Political Ecology (Peet, Robbins, & Watts, 2011, pp. 12–23).[49] However, today, it is more than just political economy. Rod Neumann (2005, p. 6) defines

> […] political ecology as ecology plus political economy, certain concepts and analytics become central to explaining human-environment relations.

[48] For a deep evolution of Political Ecology, its roots and conceptualization, and its predecessors see Neumann (2005), Forsyth (2002) or Peet, Robbins and Watts (2011).

[49] For a deeper discussion on the Marxist political economy and its influence on Political Ecology see Peet, Robbins & Watts (2011) or Watts (2013)

> Specifically, a focus on the respective roles and interactions of the state and the market and the influences on environmental outcomes is critical. (p. 6)

Unfortunately, it is not easy in general to find a concluding definition or approach to Political Ecology, as we can see in examples presented by Timothy Forsyth (2002, pp. 2–4) or Paul Robbins (2012, p. 15–16). Despite this fact, one thing is always common for every political ecologist. As Forsyth (2002, p. 267) points out, Political Ecology should be "placing more attention onto political factors underlying 'ecology'[…]." Therefore, from the point of view of a political ecologist, there is a great need to see contextual socio-political histories of the environmental changes. If we take the radical standpoint, it could be said that environmental or climate change is not the real cause, but a "symptom" (Robbins, 2012, p. 20). Political Ecology, we could say, prefers politics over environmental determinism (Bryant & Bailey, 1997, p. 6, cited in Forsyth, 2002, p. 10; Theisen, 2008, pp. 803–804). To conclude, environmental or climate change is not the real cause of conflicts, unlike the political conditions.

Among the main topics that are important for Political Ecology, noted by Robbins (2012, pp. 21–23), mainly two of them are very important for grasping the role of climate change role in conflicts: degradation and marginalization and environmental conflict and exclusion. Political Ecology understands these phenomena as an interconnected system: An unequal system leads to "overexploitation" that leads to another marginalisation, in the end producing another "overexploitation" (Robbins, 2012, pp. 21, 159). In other words, the system that marginalises some part of society pushes this society to exploit the nature that could, in the end, bring even more poverty and other exploitation. Therefore, Political Ecology looks for access to water, group relationships, or even property rights. Inequality in such processes and rights is then problematic from the point of view that it makes a certain part of society more vulnerable (Raleigh, 2010, p. 72; Peluso & Watts, 2001, pp. 5–6). This could be the problem in local terms (certain parts of societies are excluded and marginalised), but also in the global relationship between the developed global "North" and the underdeveloped global "South" (Raleigh, 2010, p. 72; Robbins, 2012, pp. 159–175). According to this position, we must understand intergroup relationships and governance in the states and how this influences the well-being and vulnerability of diverse groups or states (Raleigh, 2010, pp. 72–73). We cannot

understand conflicts without "local histories and social relations yet connected to larger processes of material transformation and power relations" (Peluso & Watts, 2001, p. 5). Therefore, we also have to understand why certain environmental, or climate situations became a problem for the state or society. Climate change-induced environmental change issues and conflicts are more likely the case of badly managed property rights, access to resources, and power relations that are reproduced in the higher vulnerability of this unusual situation (Robbins, 2012, pp. 200–201).

If we look at the very specific situation of many, if not all African states, we have to talk about neo-patrimonialism and the unequal position of African states in the world economic order. The same could be said about the fractionalisation of the African state due to high ethnic fragmentation and cleavages in some of the countries. Thus, neopatrimonialism has an important place in the understanding of marginalisation and power relations in African societies and in the understanding of the influence of climate change in Africa (Raleigh, 2010, pp. 73–75). The power relations could be compared with what Douglass North, John Wallis and Barry Weingast (2009, pp. 18–21) call "limited access order" where the governance is based on personal ties and rent redistribution to sustain a governing coalition that could eventually change in certain situations.[50]

Therefore, power relations and the way societies are able to respond to certain events are especially important in African states. In situations when some parts of society are excluded from those processes of reaction to unexpected changes, this could become a problem (Raleigh, 2010, pp. 75–76; Schmiedl, 2023). This is why some authors argue that in the Sahel, particularly Mali, for example, it is not the climate and environmental change that produce conflicts but more likely marginalisation (Benjaminsen, 2008) or structural problems like corruption or bad governance (Benjaminsen et al., 2012).

In case we compare Environmental Security and Political Ecology in a simplified way, it could be said that the former sees the roots of conflicts in physical or environmental conditions while the latter prefer politics while the environment is just an intermediary condition through which the real problems project themselves. In the most radical expression – "any statistical association between resource scarcity and conflict is

[50] Among the "shocks" that North, Wallis and Weingast (2009, p. 21) mention is also a climate disaster that could provoke some new coalition toward the "renegotiation of the distribution of privileges and rents."

spurious" (Theisen, 2008, p. 804). That is the reason why some authors argue that it is not climate change itself that is the root cause of conflicts, but the changes induced by it such as access to land or water or changes in market (Buhaug, 2016, p. 333–334). Today, there is more agreement that climate plays a rather smaller role in conflicts (Mach et al., 2019) or it is a "threat multiplier" (Barnett, 2018, p. 190). In this sense, as I (Schmiedl, 2023) or others argued (Dalby, 2010), there should not be a hard line between the two above-mentioned positions. The theories could be rather complementary and mutually merged (Dalby, 2010; Schmiedl, 2023). This is also supported in very recent study that shows how mutual streams of environmental-political research could easily help each other (Ide et al., 2023).

As we can see, scholars are not united about the mechanism and way we should understand the influence of climate change. Is it through resource/environmental scarcity where climate change influences important resources like land or water, or should we look more at institutions, power relations that provide the space for climate change through environmental change to influence conflicts and, in general humans? Various authors argue differently. One thing is clear, the influence of climate change is complex and contextual (see, for example, Ide, 2017; Homer-Dixon & Blitt, 1998; Buhaug, 2015). The reason why we can hardly find common ground about the influence of climate change on the incidence or onset of conflicts could lie in the methods, available data, or simply in theoretical expectation (Buhaug, 2015, p. 270). Today, we can say that climate change plays its part in conflicts; however, "mechanisms by which climate affects conflict are uncertain" (Mach et al. 2019, 196). The next section briefly discusses the different conditions through which scholars study the influence of climate change on the incidence of conflicts.

3.2.1 Rainfall and Droughts: Abundance versus Scarcity

One of the mainly used variables and proxy for research of the role of climate change in conflicts is rain precipitation. In this case, most of the authors look for a changes in rainfall or the presence of drought. However, there are two possible ways of argument, scarcity and abundance. Simply said, people could fight for either reason: when there is a small amount of resources they need or also in a situation when there is a lot of resources, therefore, there is something to gain. The first relates to scarcity, the second to

abundance and possible rent-seeking (Raleigh & Kniveton, 2012, p. 54). While the scarcity argument is frequent and is based on what was discussed above. The abundance mechanism may be counterintuitive. However, it could be compared to the "feasibility" argument of Collier, Hoeffler, and Rohner (2009). People do not fight in times of scarcity because it is harder to fight and there is nothing to gain (Theisen, 2012, p. 93; Raleigh & Kniveton, 2012, p. 54; Hendrix & Salehyan, 2012, pp. 36–37; Witsenburg & Adano 2009). As we shall see below, both reasonings are supported by empirical findings.

Some authors use droughts and reduced precipitation as synonymous when they use precipitation rates as a proxy for droughts (Benjaminsen et al., 2012; Buhaug, 2010), some others test rain precipitation and drought separately (Theisen, 2012). Drought is, of course, an extreme and more prolonged situation, while checking for rain precipitation is more likely looking for the rainfall variation. In general, it should be differentiated from a simple decrease in rainfall, as the meaning is contextual. The Centre for Research on Epidemiology of Disasters (2019), for example, defines drought as

> An extended period of unusually low precipitation that produces a shortage of water for people, animals and plants. Drought is different from most other hazards in that it develops slowly, sometimes even over years, and its onset is generally difficult to detect. […]

In this sense, drought is a disaster, but reduced rain precipitation could just be a short-term and small anomaly.

Unfortunately, the empirical results are not united on the influence of rain precipitation, or more precisely reduced rainfall, or droughts. Clionadh Raleigh and Dominic Kniveton (2012) on the example of East Africa prove the influence of climate variability through rain precipitation in both ways and support both the scarcity and abundance argument. According to them, it is also important to differentiate the scale of the conflict. Small conflicts are more connected to dryer years meanwhile the bigger conflicts, rebellions, are in wet years (Ibid, pp. 61–62). Similar empirical results are presented by Cullen Hendrix and Idean Salehyan (2012, p. 46), who also connect big conflicts with higher rain precipitation, while other with "extreme positive and negative deviations from normal rainfall." Similar results are supported also by Theisen (2012) or Adano et al. (2012). The connection between small conflicts and rainfall reduction is

reported in the research of Hanne Fjelde and Nina von Uexkull (2012) or later by von Uexkull (2014) on the example of civil conflicts in sub-Saharan Africa. Some authors find indirect (through food prices) but also direct influence of dry years (Raleigh, Choi, & Kniveton, 2015), others, on the other hand, find just small and contextual (Linke et al., 2015; Linke et al., 2018)[51] or conditional (Detges, 2017) support for the scarcity argument.

We also find several authors who find no support for reduced rainfall or drought-induced violence (Buhaug, 2010; Burke et al., 2009; Theisen, 2012) or for the influence of rainfall deviation (O'Loughlin, Linke & Witmer, 2014). Even in case of the indirect influence of drought, some studies find no support (Koubi et al., 2012).[52] Last but not least, Benjaminsen et al. (2012) support a more political ecological explanation of the influence of climate change conditions like reduced rainfall. Even though they admit the possible minor role of both scarcity and abundance reasoning, their major argument is built upon the structural variables as the drivers of conflicts in Mali (Ibid, p. 109). Similarly, in a recent study Stijn van Weezel (2019) also rather declines the influence of climate variability, measured through rainfall, on conflicts.

The reason for this disagreement could be understood in three ways. The first, rain precipitation as a proxy for climate change, does not influence conflict incidence as we expected. Therefore, the argument about scarcity-induced conflict due to low rain precipitation does not work as it is "infeasible" unlike the argument of "cooperation" in difficult times (Theisen, 2012, p. 93). Therefore, it is not scarcity for which people fight, but more likely abundance for which they fight. The second could be regional or contextual bias. The influence of climate change, in case of precipitation, could be different in diverse regions. This is also true for Africa as East African states are projected to be wetter (Hendrix & Salehyan, 2012, pp. 35–36; World Bank Group, 2020). Last but not least, climate change could also lead to floods due to unexpected heavy rains. Climate

[51] Linke with his colleagues (2015; 2018) use an interesting approach and arguments. They investigate the influence of drought on violence through a combination of surveys and regression and also focus on the mediation role of local institutions. A similar mediating role is also found by Adano et al. (2012). They argue that, in general, conflicts are more often in wet years in Kenya while during the dry years the local institutions "mediate agency toward cooperation and guarantee access rights to resources" (Adano et al., 2012, p. 77).

[52] In their article Vally Koubi and his colleagues investigate indirect influence of reduced rainfall through influence on economic growth (Koubi et al., 2012).

change in some areas may lead to heavy rains, even if precipitation is reduced and regions are, hence, dryer on average (Vizy & Cook, 2012, p. 5766; Busby et al., 2014, p. 725). For example, in their latest study Tobias Ide, Michael Brzoska, Jonathan F. Donges, and Carl-Friedrich Schleussner (2020) use a multi-method design to show how diverse disasters connected with climate lead to conflict. They do not use just drought, therefore, following the low precipitation-scarcity logic but also other climatic disasters (floods, landslides, or heat waves) that may have the same impact as the drought. Some scholars are actually increasingly focusing on research connected to the general climatic disaster relation to conflicts (e.g. Brzoska, 2018; Ide et al., 2020). Therefore, climate change could lead to the incidence of conflicts, but the mechanism could be different from what we expect. Not just droughts, but also floods could be important. Similarly, extreme precipitation has to be studied in both ways.

3.2.2 Rising temperature

The argument about the rise in temperature is similar to rain precipitation. Therefore, it builds on the standard scarcity argument and impact that rising temperatures could have on agriculture or the soil (Boko et al., 2007). However, some psychological literature interestingly argues that higher temperatures are enough to be related to more conflictual situations (Larrick et al., 2011) or aggressive behaviour (Vrij, Steen, & Koppelaar, 1994). In the climate change-conflict nexus, authors sometimes study temperature as a direct condition even though, as will be shown in the next section, they also work with indirect influences sometimes.

For example, scholars like John O'Loughlin, Andrew Linke and Frank Witmer (2014) show that high temperatures lead to conflict occurrence. Later Witmer et al. (2017) highlight that high temperatures lead to conflicts only under circumstances of population growth and bad political rights. The most cited work is probably the article published in *Proceedings of the National Academy of Sciences* by Marshall Burke et al. (2009). Even though they do not find support for the influence of reduced rainfall, they strongly support the impact of temperature. This article was later highly criticised and contested by Halvard Buhaug (2010) who convincingly shows that a growing temperature has no influence on conflict presence. Buhaug (2010, p. 16477) criticises operationalisation, time

limitation, but also methodological precision. This scepticism was later also supported by other authors (Theisen, 2012; Koubi et al., 2012).

The temperature influence is problematic from a point of view of operationalisation. Similarly, as in the case of precipitation, we have to distinguish between climate and weather variability – "long-term perspective" and "short-term variation" (Buhaug, 2016, p. 332). The influence of rising temperatures is highly contested from a long-term view; however, it will probably have an influence. The question is whether it will be direct or indirect and what specifically the influence will be. The influence could also be nonlinear, as Ole Theisen (2012, p. 90) discover that variations in both ways could influence conflicts. In the end, in the case of political violence and conflicts, besides personal, it is rather important to focus on the mechanism and rather indirect influence, as it seems to be improbable that a violent civil conflict would occur simply because the temperature increased by, for example, 1°C. Rather it is the impact that temperatures have on different sectors of human life, such as, for example, access to soil and water.

3.2.3 Access to Soil and Water

As we will see, some authors more focus on the direct impact of resource scarcity than climate change in their research, as they focus on access to soil/land or water; however, this could be seen as a potential mechanism of the influence of changes in rainfall or temperatures. Again, this idea is closely connected to the Eco-scarcity literature (Theisen, 2008, pp. 803–804). However, similarly to previous conditions, empirical support is not convincing. Some authors already mentioned are investigating an indirect influence through food prices (Raleigh, Choi, & Kniveton, 2015) or the market (Koubi et al., 2012). In the case of food prices, Raleigh, Choi & Kniveton (2015) support the argument that higher food prices lead to conflicts. However, Koubi, Bernauer, Kablhenn, and Spilker (2012) refute the impact of climate change through its influence on the economy.

Clionadh Raleigh and Henrik Urdal (2007) detect a rather small association of land degradation and water accessibility with an increased occurrence of conflicts. On the other hand, they support population growth and density as prerequisites for conflicts.[53] Ole Theisen (2008) found just minor support for land scarcity but no backing for the

[53] They find also support for the impact of the relation between population and water scarcity on conflict risk (Raleigh & Urdal, 2007, p. 691).

influence of access to water. In the end, he concludes that he is "more supportive of a rational choice interpretation rather than one building on relative deprivation, since proxies for development, state strength and institutional instability all turn out to be much more robust predictors of conflict than scarce resources" (Theisen, 2008, p. 815).

Later, he supports these previous findings when he finds a rather minor confirmation for the land scarcity argument (Theisen, 2012, p. 93).

Last but not least, Hendrix and Salehyan (2012) find actually the opposite effect of access to water when they find more violence in the case of water abundance. Therefore, this supports the above-mentioned results of some tests of rain precipitation.

3.2.4 Other Contextual Factors in Climate Change Research

Some authors choose a different approach to study the role of climate change in conflicts as they choose the cases of resource-limited vulnerable areas (Bretthauer, 2015) or conduct research on the difference between violent and non-violent environmental conflicts (Ide, 2015) or look for a more contextual explanation than simple climate/environmental change-induced conflicts (Detges, 2016).

The first two articles are of special interest to this dissertation as they take advantage of QCA. Judith Bretthauer (2015) is testing cases vulnerable to resource scarcity. Even though she focuses on resource scarcity, her results are also relevant for grasping the climate change-conflict nexus. With the use of QCA, she concludes with interesting results: first, she discovers the importance of ingenuity through higher education; second, the importance of structure of GDP, particularly "dependence on agriculture"; third, the significance of understanding those conditions in mutual combinations. On the other hand, it could be argued that her choice of cases could be problematic as she chooses cases based on the accessibility of water and arable land (Ibid., pp. 599–600). This could be problematic as according to these thresholds a resource-scarce country is, for example, Cape Verde, that is, with its island position really specific. Interestingly, none of the Sahelian countries made it into her data set that could highly influence the results (Bretthauer, 2015).[54] The cases, therefore, could be biased towards small, island or

[54] For African countries, we can find Burundi, Djibouti, Eritrea, Kenya, Rwanda, Algeria, Egypt, Lesotho and Cape Verde (Bretthauer, 2015, p. 601). Of course, resource scarcity could also be the case for the

mountainous countries. This could be a problem due to the fact that the Sahelian countries are often seen as one of the most vulnerable countries to climate and further environmental change.

Tobias Ide (2015) in his article looks for conditions that make environmental conflicts violent. His contribution is important from the point of view of the contextuality of scarcity conflicts and also from a methodological point of view when he employs well-executed QCA with several robustness checks. Convincingly, he proves that "the simultaneous presence of two structural conditions (negative othering and low power differences) and one triggering condition (recent political change) is sufficient for the violent escalation […]" (Ibid, p. 68).

Last but not least, there is the interesting contribution of Adrien Detges (2016) who highlighted the importance of administration and infrastructure in the case of conflicts over resource scarcity. As mentioned earlier, the context is important in the case of the influence of climate change and, more generally the influence of resource scarcity. As presented in this section, we have seen that a diverse context of institutions, infrastructure, power relations, and marginalisation or education is important from the point of view of resource scarcity and possible climate change influence on the onset or incidence of conflicts. Indeed, it is high contextuality that is often highlighted by authors who focus on climate change/resource scarcity impact on conflicts (Ide, 2015, 2017; Buhaug, 2015, 2016; Homer-Dixon & Blitt, 1998; Schmiedl, 2019b, 2023).

3.3 Brief conclusion

To conclude, it is hard to find agreement among scholars on conflicts, and it is even harder among scholars on the role of climate/environmental change in conflicts. Although most of them admit that there is some kind of relationship, it is hard to identify a mechanism and way in which climate change influences the incidence of conflicts. The authors agree on that the mechanism of climate-change-induced conflicts is contextual and often influenced by local conditions. Also, the matter of data is sometimes challenged as it is hard to distinguish short-term variability and long-term changes. Some scholars recently

mountainous or island countries but those will be really different from the large countries that could suffer from resource scarcity but these countries are not included according to her thresholds.

called for mutual complementarity of the knowledge from the field of general conflict studies, Environmental Security, Political Ecology and climate change and conflict research in the quest to fully understand the role of climate change in conflicts (Ide et al., 2023; Schmiedl, 2023).

Also, there is a clear importance of the focus on different kinds of conflict and in the quest to identify the mechanism of the role of climate change, it is important to understand local conditions of influence. It seems that simple inclusion of changes in temperature is not enough, although there are psychological works that point to the direct causality between higher temperatures and conflicts (Larrick et al., 2011). The reason is that scholars more likely expect some indirect causality of global climate change through a worsened access to water, land, food production or some extreme demonstration of climate change like droughts or floods (see, e.g., Raleigh, Choi, & Kniveton, 2015; Fjelde & von Uexkull, 2012; Linke et al., 2015). Some others even argue that the influence of those resource scarcity proxies is influenced by other conditions like infrastructure (e.g., Detges, 2016) or political marginalisation (e.g., Ide, 2015). Although some authors rather support the notion that climate change leads to conflicts (e.g., Burke et al., 2009; Devitt & Tol, 2012). Others are rather restrained in the case of the influence or mechanism through which climate change impacts the incidence of conflicts (cf. Buhaug 2015; Buhaug et al. 2014). Altogether, the whole idea revolves around the resources connected to climate change. The argument focusses rather on scarcity. However, some studies show that it is rather abundance that causes conflicts. Contextuality then turns the discussion to management, infrastructure and political factors (cf. Alao, 2007; Le Billon, 2001).

This thesis aims to join this debate by a focus on climate-change vulnerable countries and explore what conditions make some of them more conflictual than others. In the next chapter, we discuss the ambition to bring “classical” conflict conditions together with climate change into one framework to shed light upon the climate change-conflict nexus and therefore shed light on the mechanism through which climate-change vulnerability evolves into conflicts.

4 Research Framework: Bringing Political, Structural and Environmental/Climatic Factors Together in Conflict Research

In general, it is clear that to uncover the role of climate change in conflicts is one of the biggest quests of conflict and security studies. However, today we can agree that "the role of climate is judged to be small compared to other drivers of conflict, and the mechanisms by which climate affects conflict are uncertain" (Mach et al., 2019, p. 196). In the previous chapter, a diversity of conceptual and theoretical approaches to the study of conflicts and role of climate and environmental change was reviewed. Different countries are vulnerable to climate change in different ways. However, why are some countries vulnerable to climate change more prone to conflicts? Why do such countries have a higher incidence of various conflicts?

Various scholars find different empirical results with the use of numerous methods and approaches as we have seen in the previous chapter. Some focus on case studies of often mentioned cases (Benjaminsen et al., 2012; Adano et al., 2012). Some others use global regression (Burke et al. 2009) and some choose cases that are already resource scarce or conflictual due to climate change and look at context (Bretthauer, 2015; Ide, 2015). This thesis approach combines the selection of cases based on the vulnerability to climate change and contextuality under which these cases that are influenced or prone to be influenced by climate change become more conflictual. Therefore, the aim is to merge general knowledge about conflicts with climate change variables. In doing so, the dissertation builds on the two-level approach, where the first one is more focused on climate change and the second level on other conditions. Altogether, the framework combines political, institutional, but also environmental and climate change variables. As mentioned above, climate change schools, mainly Political Ecology, understand climate change as contextual and more likely connected to political factors.

The first level of the framework is the analysis of vulnerability to climate change among African countries. The second level of the analysis focuses on the most vulnerable countries, and, with the use of Qualitative Comparative Analysis, it discusses the contextual factors under which the vulnerability escalates into civil violent or inter-communal conflicts. With this approach, this study stands apart from standard regression of global data and also local case studies while preserving standard factors and its operationalisation throughout the whole framework. Both levels effectively combine

knowledge and variables from conflict research and climate-conflict research. In the first level it is mainly a focus on climate change variables and the eco-scarcity understanding of its impact (some of them like poverty and population density are also often used variables in research of conflicts) while as the second level combines conditions based on Political Ecology, Eco-Scarcity or Security Studies, that helps to understand the contextuality of climate change impact with academic debate about other factors in conflict research.

Hence, the first step is based on the choice of cases according to their vulnerability to climate change. This helps to differentiate countries that are not affected so much by climate change and those which are affected by it, but thanks to wealth or good governance, they are able to deal with it more effectively. This is not saying that countries that are not vulnerable do not experience conflicts or that climatic conditions cannot influence the incidence or onset of conflicts in those less vulnerable. However, the thesis prefers to focus on hotspots of climate change influence and choosing the states that are typical cases of climate change impact. Together, it combines the approach of standard conflict analysis, but it limits the choice of cases with the use of studies focused on vulnerability-security framework analysis (e.g., Busby et al., 2012, 2013, 2014)

The vulnerability to climate change is one of the specific fields of climate change-conflict nexus. For example, Clionadh Raleigh, Lisa Jordan, and Idean Salehyan (2008) focus mainly on migration as the outcome of climate change. Joshua Busby et al. (2012; 2013; 2014) combines climate change and security vulnerability in a framework that allows them to evaluate the security threat due to climate change. Similar vulnerability models are used in a working paper by David Wheeler (2011) who in his global study of climate change vulnerability ranks countries according to their physical but also socio-political vulnerability or report by Polly Ericksen, Philip Thorton, An Notenbaert, Laura Cramer, Peter Jones, and Mario Herrero (2011) who focus on climate change vulnerability in connection to food security and other diverse factors.

By a brief review, we will realise that most of them focus on similar aspects and proxies of climatic vulnerability. In case of physical exposure, the articles mostly rely on EM-DAT (2019) data of natural disasters from the Centre for Research on the Epidemiology of Disasters (CRED). The differences are in the case of other indicators.

Raleigh, Jordan, and Salehyan (2008, p. 13) choose, for example, GDP per capita and population in 2050. Busby et al. (2014, p. 719) combine "physical exposure, population density, households and community resilience, and governance and political violence." Therefore, similarly to Raleigh, Jordan, and Salehyan (2008), they highlight the importance of population and poverty even though in the case of Busby et al. (2014) poverty is multi-dimensional as they also include, for example, health and education and proxy for governance. Last but not least, study of Busby et al. (2014) is the only one that uses a sub-national level of vulnerability research. Wheeler (2011) also added other proxies to the basic physical exposure. He uses proxies like income or some qualitative measures of governance. What makes his study different from two already mentioned are two proxies: sea level rise and slump of agricultural sector (Ibid., p. 34). Similar to previous ones, Ericksen et al. (2011) also adds other economic or agricultural conditions to climatic variables.

To conclude, climate change vulnerability is not simply the occurrence of droughts, extreme temperatures, or floods. It is a mutual co-occurrence of the factors that enable climatic conditions to put pressure on society.

4.1 Vulnerable countries in Africa

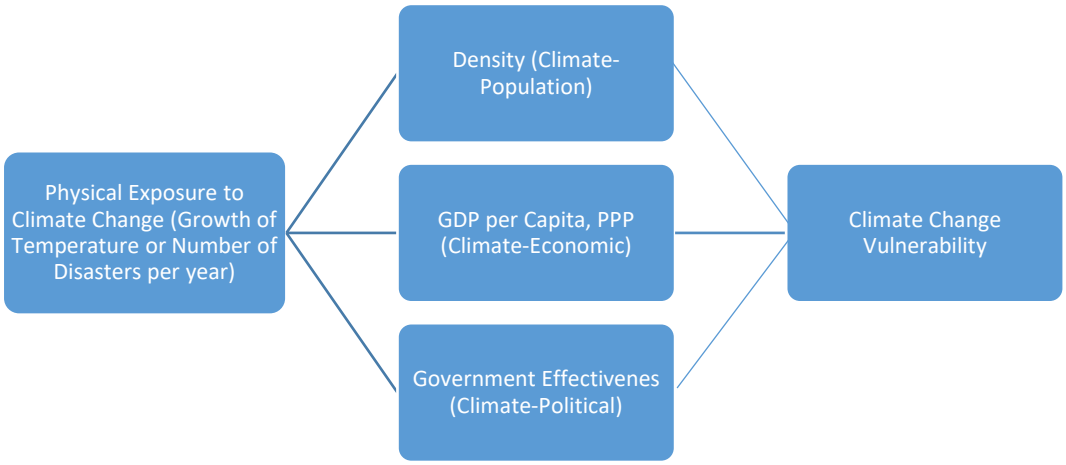
In this framework, climate change vulnerability is judged according to one main and three side indicators. The main indicator is based on physical exposure to climate change. Similar to others (e.g. Busby et al., 2012, 2013, 2013; Raleigh, Jordan, & Salehyan, 2008; Wheeler, 2011; Ericksen et al., 2011), the focus is on a number of climatic catastrophes, droughts, and floods. To this, the framework adds the rise of temperature in observed years. The three supporting factors are poverty, bad governance, and density.

Areas that are evaluated as highly vulnerable are those with a compound number of disasters per year or the compound annual growth rate of temperature in the top 30% of all African countries and are also in the top 30% of all African countries in one of the supporting factors.[55] Therefore, the most vulnerable countries in this work are countries that combine physical/climatic exposure with poverty, bad governance, or high density

[55] For inclusion the same threshold as in Raleigh, Jordan and Salehyan (2008, p. 13) is used

(for operationalisation see Table 1).[56] The reasons for this are both empirical and theoretical. The exposure to climate change varies, and some states seem to be more sensitive to climate change based on bases of poverty because of malnutrition or health, while others because of the bad adaptation strategies or dense population. Physical exposure to climate change does not automatically mean that it adds new stress to the population living in the country. Simply put, there is a great difference whether the drought or flood appears in Ghana, Nigeria or Sudan. Therefore, the list of the most vulnerable areas combines three sets of countries' vulnerabilities: climate-political, climate-economic, and climate-population vulnerability (see Fig. 8). This is built on Homer-Dixon (1999, pp. 15, 48) sources of resource scarcity that are adapted and combined to create sources of vulnerability to climate change. In the Homer-Dixon (1999, p. 48) sense, climate change influences conflicts through supply-induced scarcity; climate change leads to a smaller and smaller number of resources. As climate change is expected to lower resources, it will always be on the supply side of scarcity. This could be combined with additional scarcities – demand and structural. In the first one, climate is combined with the growing demand, hence supply-demand vulnerability. In the second set, climate goes together with an already low supply, poverty, leading to supply-supply vulnerability. In the last one, climate change is linked with structural issues, leading to supply-structural vulnerability.

Figure 8 Climate Chaneg Vulnerability Mechanisms



(Author)

[56] In case of all factors, an average value of the factor in studied years (2000-2017) is compared.

The choice of indicators is not built just upon the previously mentioned studies, but also on theoretical knowledge discussed in previous chapters. Vulnerability in this sense is contextual and exposure to climate change is dependent on at least one of the other variables (Raleigh, Jordan & Salehyan, 2008, p. 6; Webersik, 2010, p. 122). Physical exposure as the part of vulnerability is based on a dataset of climate catastrophes and the compound annual growth of temperature. Mainly the number of disasters' years in sub-Saharan countries between 2000 and 2017 based on EM-DAT (2020) is used.[57] The temperature growth is calculated with use of data on monthly temperatures between 2000 and 2016 from the Climate Knowledge Portal (CKP) by the World Bank Group (2020).[58] Obviously, the sets can effectively overlap. In the first set, climate-population (supply-demand) vulnerability, there are countries that have to deal with resource scarcity due to climate change and a growing population. The reasoning behind it is based on Homer-Dixon's (1999, p. 48) demand-induced scarcity logic in combination with climate change supply-induced scarcity. Simply put, due to a larger population and climate change there are less resources to divide among more people. You can have a good strategy, even money, but the population pressure and climate pressure are too high. In the situation of a highly dense population, the impact of climate change on diverse sectors could easily lead to grievances, poverty, malnutrition, etc. This mechanism is built on the Malthusian idea already mentioned previously in combination with additional stress from climate change. Also, in a situation of climate change in dense areas, more people need help which puts a heavy burden on government (Busby et al., 2014, p. 720). To measure this vulnerability, population density data from FAO aggregated by World Bank (2020j) is used.

The second mechanism of vulnerability, climate change-economic (supply-supply), is a problem on the other side of the coin. This is more likely grounded in possible

[57] The years of disaster are counted which means that in case the drought was two-years it is counted separately for each year and not as one single occurrence. The reason behind this logic is qualitative and adds the length and situation when several separate droughts or floods appear in one state. In case that there were, for example, two droughts that occurred in two states, and in one state they would be short one-year droughts and in the second state one would be four-years and another a three-year drought, they are qualitatively different. The first state would not have suffered as long from drought as the second one.

[58] The data used here were accessed on April 2020 and are therefore relevant for that year of publication. CCKP data are based on Harris et al. (2014) *Updated high-resolution grids of monthly climatic observations – CRU TS3.10: The Climatic Research Unit (CRU) Time-Series (TS) Version 3.10 Dataset*

adaptability. In the case of climate change, the poor country has a lower range of adaptation strategies. Due to poverty and low resources, the government is not able to help or activate adaptation or mitigation strategies. There is no money for it or no know-how. Here, the framework combines Homer-Dixon's (1999, p. 48) supply-induced scarcity with an additional supply scarcity due to climate change. These states already have a limited number of sources. Due to climate change, this is even more reduced and scarce. And because those states are poor (scarce on supply side), they are also not able to react. Partly this is similar to what Busby et al. (2014, p. 721) call resilience even though the framework of this thesis measures it with a focus on the state level. In this view, these states have a low economic capacity to react to climate change. Therefore, the capacity cannot be used to solve climate change impacts. The GDP per capita PPP according to the World Bank (2020) is used to measure this vulnerability.

The third mechanism of vulnerability, climate-change-political (supply-structural), again looks for adaptability. Effective governments are able to react faster, more effectively, and are able to divide money to the population efficiently. Inspiration here is the vulnerability index by Busby et al. (2014), but also theoretical knowledge of both Environmental Security and Political Ecology. Even rich governments could have problems solving the impact of climate change when it is ineffective and marginalise parts of the population. The marginalised and those forgotten by an inappropriate government division of public goods leads to vulnerability. This is not far from arguments of Political Ecology (see Raleigh, 2010; Peluso & Watts, 2001). Even a rich government, where there is no population pressure, can fail due to bad governance. In this regard, this links supply-induced scarcity with what Homer-Dixon (1999, p. 48) calls structural-induced scarcity logic. In this set, the framework checks government effectiveness with the use of data from Worldwide Governance Indicators (Kaufmann, Kraay, & Mastruzzi, 2010; Kaufmann & Kraay, 2020).

Table 1 Climate Change Vulnerability Indicators

	Proxy
Climate Change	EM-DAT (2020) – number of droughts and floods per year (2000-2017) CKP (2020) – Compound growth rate of temperature (2000-2016)

Poverty	World Bank (2020) – Average GDP per capita, PPP (current international $) (2000-2017)[59]
Government Effectiveness	Kaufmann, Kraay and Mastruzzi (2010); Kaufmann and Kraay (2020) – Worldwide Governance Indicators – Average Government Effectiveness (2000-2017)
Density	Food and Agriculture Organization and World Bank Population estimates (2020j) - Average Population density (2000-2017)[60] (South Sudan and Sudan density is based on calculation of GapMinder (2020))

(Author)

To conclude the vulnerability sets, the first two are mostly grounded in Eco-scarcity while the third takes some points from Political Ecology into consideration. Needless to say, all three sub-indicators are also often studied in conflict research. This leads to three groups of countries whose vulnerability rises from three different points of view (see Table 2). Some of them are obviously in all three, which Burundi is an example of. Others are members of two vulnerability sets, e.g., Ethiopia, Malawi, or Somalia. Together, this brings 12 countries vulnerable to climate change that will be used for further analysis with the use of Qualitative Comparative Analysis.

To validate the case selection, it is possible to compare them with some previous studies on vulnerability to climate change. If we compare it with the study by Raleigh, Jordan, and Salehyan (2008, p. 16), we can realise slight differences that could be the outcome of their focus on a global comparison. Similarly to them, the results highlight Mozambique, Somalia, Malawi, Nigeria, and Sudan. However, they also include Burkina Faso, Rwanda, Tanzania or Madagascar (Ibid.). In the case of Madagascar, the reason could lie in fact that the focus of this dissertation is on continental Africa. In the case of Rwanda and Burkina Faso the reason could be the different timespan as neither of them was included due to low sensitivity to physical exposure. Tanzania stands outside of the

[59] By the time of writing this chapter, there were no data available for Somalia, but we can accept that Somalia in the context of the rest of Africa would probably be among the poorest countries. Even in a situation when we would exclude Somalia from the first set it would be included in Climate Change-Political Vulnerability

[60] The South Sudan and Sudan density is based on the calculation of GapMinder (2020)

most vulnerable countries to climate change because it did not pass any of the sub-indicators while being sensitive to physical exposure.

Table 2 Climate change Vulnerability - Countries

Climate Change-Density	Climate Change-Political	Climate Change-Economic
Burundi, Ethiopia, Kenya, Lesotho, Malawi, Nigeria, Uganda	Burundi, Chad, Somalia, Sudan	Burundi, Ethiopia, Malawi, Mozambique, Niger, Somalia

(Author)

If we compare the results with the Wheeler (2011, pp. 35–37) index of vulnerability where he compares poor countries around the world. Again, we can find similarly vulnerable countries like Burundi, Sudan, Ethiopia, Malawi, Niger, Lesotho, or Chad that are among those states which he also placed among the top 20 most climate change vulnerable countries globally. However, some countries like the Central African Republic, Rwanda, Senegal, or Mali appear much higher in his ranking while others like Nigeria, Uganda or Mozambique appear much lower. The reason lies in the different construction of the index and the focus on different indicators. As he highlights, the Central African Republic position in the ranking is mainly due to "agricultural productivity loss" (Wheeler, 2011, p. 33) which was not included in the vulnerability framework of this thesis. As the Central African Republic has rather low physical exposure, it is not included here. In the case of Nigeria, the reason lies in the way Wheeler measures climatic indicators. As he compares them as per capita values, therefore populous country like Nigeria is positioned lower (Wheeler, 2011, p. 32). From this point of view it is also an interesting position of Somalia that Wheeler ranks quite low in the list (Wheeler, 2011, p. 36).[61] The reason is again the inclusion of agricultural loss. When we compare just the single indicator of extreme weather for Somalia, it is much higher than the Central African Republic, Burundi, Sudan, or Rwanda that are the four most vulnerable countries in the Wheeler (2011, p. 36) ranking. However, with very low agricultural losses in the case of Somalia, this leads to its lower ranking. However, in the case of Somalia, agriculture is affected by a high incidence of conflicts, and therefore the

[61] If we would take just African countries, it is in 26th position (Wheeler, 2011, p. 36).

lost in production cannot be high, as it is already low. Even Wheeler (2011, p. 34) admits that the ranking is a little bit biased as "the indicator for agricultural productivity loss tends to dominate many overall indicator values because its cross-country distribution is much less skewed than the distributions for sea level rise and extreme weather change."

Last but not least, when we compare the results with the results for the 20th century and 21st century of Busby et al. (2014, p. 725) we can find common ground in the case of Niger, Chad, Somalia, Ethiopia, and Sudan while they add, for example, DRC, Guinea or Sierra Leone. Also in this thesis, vulnerable areas in southern Africa (Lesotho, Malawi, and Mozambique) are highlighted while this is the case for Malawi and Mozambique only in a Busby et al. (2014) simulation for the 21st century. They also show a heavier impact, in general, in the Sahel (Mali or Burkina Faso) (Ibid., pp. 725–726). The differences come from the different data and methodology used. Busby et al. (2014) use a disaggregated analysis, and they focus on sub-national units, areas, of vulnerability while the focus in this thesis is on the national level.

In conclusion, it is difficult to agree on which countries are the most vulnerable to climate change in Africa. It depends on methodology, thresholds, and data used. Although some countries appear simultaneously in most of the research. Sahelian countries, Sudan and parts of East Africa and the Horn of Africa appear with bigger or smaller differences. The list of the most vulnerable countries of this work is based on theoretical backgrounds in Environmental Security and mainly serves for a further analysis of conditions leading to violent conflicts in these countries. Although the selected cases have their vulnerability to climate change in common, the list concludes with diverse countries from populous and relatively big ones like Nigeria to small ones like Lesotho. They also exhibit a diversity in the incidence of violent conflicts that they exhibit, ranging from a relatively calm Malawi to a very harsh situation in Somalia. This leads to hypotheses that will be used for further analysis of this variance.

4.2 Marginalization, Stability and Scarcity

The second level of the analysis is based on Qualitative Comparative Analysis. The method will be described in the next chapter. Before we approach this, we need to deal with the whole framework and establish hypotheses. After we have identified the most

vulnerable countries now it is time to ask why some of them are more conflictual and some not.

Some of the climate-change vulnerable countries apparently suffer from more conflicts than others. It was already mentioned that climate change impact is very contextual, hence the reason could lie in the structural and political conditions that lead to more conflicts in countries that suffer from climate change impact. From literature review and debate on mechanisms and logics of conflicts, we know that several diverse conditions seem to be very important. At the second level of the analysis, the thesis brings together some of the variables from Environmental Security, conflict studies, but mainly from Political Ecology. In this regard, all these theoretical standpoints are not mutually exclusive but could be merged.

In the framework, the vulnerability to climate change could be transformed into conflicts just in very specific structural and political or other contextual situations. Based on the knowledge of previously mentioned theories and empirical workings, the thesis argues for two specific models, one for violent civil conflicts (state versus rebels) and one for inter-communal conflicts (two communities fight each other). Even though the conditions for models overlap a little bit, the mechanisms could be different. In the case of violent civil conflicts, the thesis argues that the mutual interplay between oil curse, marginalisation, land scarcity (access to land), and regime instability make climate change vulnerable states rather conflictual. On the other hand, in the case of inter-communal conflicts, it is a combination of marginalisation, land and water scarcity, and urbanization (rural-urban migration).[62] As we can see, both models therefore combine scarcity conditions, standard greed and grievance conditions and marginalisation that is very often mentioned by Political Ecology. Therefore, the dissertation argues that conflicts in states which are highly affected by climate change appear under mutual interplay between scarcity, political, and structural conditions.

Social and political equality or marginalisation, and vice versa, is a key component of the framework. It has a strong position in Political Ecology literature, as many authors

[62] It could be argued that there are other conditions that are omitted. Due to few cases and the many variables problem, it has been decided to stick with those. The higher amount of the conditions could be problematic from methodological point of view. This will be further discussed in chapter 5.

argue that in case of environmental scarcity or climate change, it is this specific political condition that is conflictual (Raleigh, 2010, p. 70; Peluso & Watts, 2001, pp. 5–6). Marginalised groups are very often much more hit by climate change, which could lead to inter-communal conflicts but also to grievances against the state (Raleigh, 2010, pp. 70–73). Obviously, in the specific context of Africa, this condition could be understood from an ethnic point of view. Even though for authors like Collier and Hoeffler (1998; 2004) ethnicity fractionalisation or domination works at some point, it is rather access to power and marginalisation that is important (Bormann, Cederman, & Vogt, 2017, p. 759). It is strongly based on grievances that appear when a group feels it is marginalised. Therefore, it is horizontal inequality - the "inequalities in economic, social or political dimensions or cultural status between culturally defined groups" (Stewart, 2008, p. 3) – which matters. Therefore, where significant political marginalisation occurs, the conflict is more probable. This is even more apparent in the cases of environmental degradation and climate change. The groups in an unequal position will not gain support from a state in case of climate change and climatic disasters connected to it, while some others will receive it. Therefore, these grievances could cause conflicts both against the state and also between different groups. Even though this condition focuses on political marginalisation, in line with the horizontal inequality argument, it could also stand as a proxy for ethnicity.

> *Hypothesis 1: Rather lower equality in terms of access to power (marginalisation) contributes to a rather higher incidence of violent inter-communal and civil conflicts in climate-change vulnerable countries.*

Land scarcity is rather variable from Eco-scarcity. From previous chapters (Chapter 1) we know that Africa is highly dependent on agriculture. This makes it very vulnerable to climate change due to the growing aridity of soil and subsequent danger to food security, but also from the non-climatic point of view of a growing population and hence pressure on resource access. From a theoretical point of view, this argument is close to relative deprivation and the grievance mechanism of conflicts (Theisen, 2008, p. 804). Indeed, land scarcity is a typical condition from the point of view of supply-induced scarcity where the population has to deal with the lower number of resources (Homer-Dixon, 1999, p. 15). Without access to land, the population cannot secure proper

livelihood. This could lead to grievances against the state or to fighting over scarce land between different communities. Recently, this logic has been highly studied because of growth in conflicts between farmers and herders in Africa (see, e.g., Turner, 2004; Turner et al., 2011; Benjaminsen et al., 2012; Adam, Pretzsch & Darr, 2015; Higazi, 2016; Dimelu, Salifu & Igbokwe, 2016). Even though the criticism from Political Ecology or legal anthropology is clear (van Leeuwen & van der Haar, 2016, pp. 96–97) in the case of this variable, it is rather the Environmental Security school position as the Political Ecology approach is added to this condition in the above-mentioned equality. As very often land issues are argued to be at the core of both, violent civil conflicts and inter-communal conflicts, the thesis examines the impacts of this condition on both of them. This leads to the second hypothesis.

> *Hypothesis 2: Relative land scarcity contributes to a rather higher incidence of violent inter-communal and civil conflicts in climate change vulnerable countries.*

The logic behind water scarcity is similar to that of land scarcity. Built on Eco-scarcity, this again stems from grievance mechanism. Simply said, when something is scarce for more people or groups it becomes conflictual (Baechler, 1999, p. 6). In the case of access to water and climate change, water is also important from the point of view of local adaptation and mitigation. Good access to water can help people survive the unexpected situation of local communities in case of climatic disasters like droughts or reduced rainfall. This condition is therefore understood in rather an infrastructural point of view. However, in the case of water scarcity, inter-communal competition for the resources emerges. Furthermore, stress could then lead to conflicts (Baechler, 1999, p. 70). In case of water rights, the law system could favour one group over the other, farmers over the herders, sedentary over nomadic, as is the case in the Sahel (Cotula & Sylla, 2006; Benjaminsen & Ba, 2021, pp. 10–14). There is still quite a small amount of research that includes access to water as a cause of conflicts (e.g., Döring, 2020; Raleigh & Urdal, 2007; Theisen, 2008). Although a dispute over a water well or other water source could escalate into further civil conflict and state mitigation is an important contextual factor (Döring, 2020), this thesis finds this condition to be more locally unique and influencing more relationships between communities than land issues that are often argued to be at

the centre of violent civil conflicts. Therefore, this condition will be examined just in the case of inter-communal conflicts.[63]

> *Hypothesis 3: Relative water scarcity contributes to a rather higher incidence of violent inter-communal conflicts in countries vulnerable to climate change.*

Internal migration is another important condition for conflicts (Raleigh, Jordan, & Salehyan, 2008, p. 34). According to Rafael Reuveny (2007, p. 659) there are at least four ways through which migration breeds conflicts: 1) "native-migrant contest over resources," 2) "ethnic tension," 3) "distrust" between newcomers and original inhabitants, 4) "socio-economic fault lines." In case of climate change, migration is an important adaptation strategy (Raleigh, Jordan & Salehyan, 2008, p. 19). Especially, in poor countries where the government is not able to help (Reuveny, 2007, p. 657). This pattern is also apparent in the case of African countries.

According to Raleigh, Jordan and Salehyan (2008, p. 36), however, it "is not migration per se, but changing demographics". Therefore, it is rather the demographic pressure added to the population. This could be particularly important in urban areas in case of rural-urban migration where it could lead to "urbanization without growth" (Fay & Opal, 2000). Those areas become possible hotspots for the mechanisms mentioned above. The reason is that migration creates high pressure on resources and employment, which could be neglected (Raleigh, 2015, p. 104). With distrust or competition, this could easily provoke xenophobia, inter-communal conflicts, and violence (Schmiedl, 2019, pp. 145–146). This becomes even more dangerous in connection with marginalisation and neglected development of urban areas (Raleigh, 2015, pp. 91–92). Urbanisation could therefore be an important conflictual factor (Raleigh, Jordan, & Salehyan, 2008, p. 36; Kahl, 2006, p. 37; Raleigh, 2015: p. 92). Therefore, people in urban areas could be easily mobilised for violence by various communal or clan groups or by criminal groups (Webersik, 2010: p. 37; Eklöw & Krampe, 2019, pp. 28–29). Hence, we can understand the migration, through the mechanism of urbanisation, important particularly for inter-

[63] However, as you can see later, both access to water and access to land will be tested as part of a test of robustness. Even though the solution path could work the problem of too many variables could appear as explained later.

communal conflicts because the mechanisms are rather local (ethnic tension or distrust) and therefore do not influence the competition for state. Also, with pressure on urban areas, this hypothesis rather focuses on a particular pattern of rural-urban migration.

> *Hypothesis 4: Relatively high rates of urbanisation contribute to a rather higher incidence of violent inter-communal conflicts in climate-change vulnerable countries.*

The oil curse is often studied as the condition for civil wars and big conflicts. There are diverse logics. Collier and Hoeffler (1999; 2004) focus on general dependence on natural resources through greed logic of conflicts, which Kahl (2006, pp. 14–15) calls the "honey pot hypothesis." However, the logic could also be based on grievances that stem from land and water degradation (Courson, 2011, p. 22; Bagaji et al., 2011, p. 37). One or the other mechanism could easily provoke a conflict against the state that is the recipient of the rents. Therefore, there is a possible goal of capturing the rents by rebels or stopping environmental degradation in the area. Indeed, with the character of rents and the often-cited influence of the oil/resource curse (e.g., Ross, 2001; Okpanachi & Andrews, 2012; Sala-i-Martin & Subramanian, 2013) this condition is used just in case of violent civil conflicts. Although the mechanism could be contested and depends on actual cases, it is an important condition to study in case of violent civil conflicts.

> *Hypothesis 5: Rather high dependence on oil contributes to a rather higher incidence of violent civil conflict events in climate change vulnerable countries.*

Last but not least, regime stability is very important from the point of view of both greed and opportunity logic. Changes in the case of a regime often prohibit the regime from building its position. This means that it is an easy target for rebels (Fearon & Laitin, 2003, p. 88; Ide, 2015, p. 63). Indeed, strong and stable states deter rebels simply through "cost-benefit calculations" (Kahl, 2006, p. 45). However, it is not just an opportunity. According to Collier and Hoeffler (2004, p. 589), a stable regime reduces the old grievances. Therefore, based on both arguments, such a regime has a strong regulatory position in case of internal relationships. Last but not least, the regime reaction is important from the viewpoint of adaptation and mitigation of situations of climate change impact (Raleigh, Jordan & Salehyan, 2008, pp. 29–33). This is important because the

environmental pressure could make the state even weaker. For unstable regimes, it is much harder to mitigate climate change consequences that in the end could breed grievances or show weakness to greedy rebels (Kahl, 2006, pp. 40–44; Raleigh & Urdal, 2007, p. 679).

> *Hypothesis 6: Rather often change of regimes contributes to a rather higher incidence of violent civil conflict events in climate change vulnerable countries.*

To conclude, this dissertation argues that there is a mutual interconnection among these conditions and that there are several pathways to the high incidence of violent civil and inter-communal conflicts. Therefore, it is expected that all the conditions are INUS conditions - "insufficient but necessary part of a condition which is itself unnecessary but sufficient for the result" (Mackie, 1965, p. 245). Although there are two variables that are understood as to contribute in the same way for both violent inter-communal and civil conflicts (marginalisation and land scarcity), the conflicts are expected to be different in two others. However, the most important aspect is that conditions mutually interrelate and influence each other, ultimately influencing the occurrence of conflicts. Therefore, hypotheses are not mutually separable and should not be understood in a mutual vacuum. The next chapter will deal with the method, data and operationalisations.

5 Qualitative Comparative Analysis

Qualitative Comparative Analysis (QCA) is still a rather new method, which is definitely not mainstream for most of political scientists, Africanists or in general social scientists. This is also the reason why, even though it is a formal method with formal steps of analysis, there are great disputes about its value, proper use, and conclusions that could be made on its basis.

The goal of this chapter is not to present a deep description of the method, which can be done in classic works on QCA, however, as it could still be understood as a non-mainstream method, it is important to mention at least some basic characteristics.[64] Indeed, it is important for the reader to understand at least the basics behind the general usage and formal steps. Therefore, this chapter will discuss QCA in a nutshell with the current development of the method and the most important discussions. The data used in QCA, and operationalisation is also discussed later in the chapter.

5.1 What is QCA?

Qualitative comparative analysis (QCA) is a method that was first introduced by Charles Ragin in the 1980s (Ragin, 2014). First, it was understood as mix of qualitative and quantitative methods, and as part of so-called configurational methods, it should overcome the need to decide whether a scholar will focus on details of few cases or general patterns over many cases (Ragin et al., 2003, p. 324; Kouba, 2011, p. 468; Berg-Schlosser et al., 2009, pp. 3–4; Ide & Mello, 2022, p. 3). However, as Ragin (2014, pp. 1–2) points out, it "is not a compromise between qualitative and quantitative methods, nor is it an attempt to reshape one in the image of the other." Although still quite a new method, it is clearly on the rise (Ide & Mello, 2022, pp. 2–3). Today, it presents three subtypes of methods: cs/QCA, fs/QCA, mv/QCA (Rihoux & Ragin, 2009, pp. xix–xx; Schneider & Wagemann, 2012, pp. 13–16).[65] This thesis uses a fuzzy set version

[64] The goal of this thesis is definitely not a deep methodological discussion, therefore it is better to refer to works that can show the reader more of the basics of a method, for example, see the works of Ragin (2008), Rihoux and Ragin (2009a), Schneider and Wagemann (2012), Mello (2021) or in Czech Kouba (2011). For a further deeper discussion of QCA in R software, see the books of Duşa (2019) or Thiem (2013) or for a general overview of the software, the article of Thiem and Duşa (2013)

[65] These kinds of methods have same logic, but they work with different kinds of variables. Cs/QCA is working just with dichotomous variables, fs/QCA is able to work with continual variables and mv/QCA with categorical variables, see an edited volume by Benoît Rihoux, and Charles Ragin (2009a)

(fs/QCA) of the method, which enables scholars to use continual variables (Ragin, 2009, p. 89). In general, the method is based on the set-theoretical approach. It has several advantages among which the so-called "configuration" character is the most important for the objective of this thesis and means that a researcher a priori expects mutual relations between variables that lead to the outcome (Ragin, 2008, pp. 8–9). This means that QCA presents results as "conjunctural causation" hence "the effect of a single condition unfolding only in combination with other, precisely specified conditions" (Schneider & Wagemann, 2012, p. 78). Moreover, the method's other characteristic is "equifinality", which means that "multiple pathways of conditions lead to the same outcome" (Ide & Mello, 2022, p. 4). These are the reasons why this method is seen by some as very appropriate for analyses of conflicts and the sociopolitical impacts of climate change (see, e.g., Ide, 2017).

QCA has its formal steps in the analysis. As it is sensitive to necessary and sufficient conditions, the first step is the analysis of necessity. Later, using the truth table, we analyse the sufficiency of conditions and combinations. Last but not least, there is a need for a separate analysis of the absence of outcome, as the method is based on an asymmetrical understanding of causality (Kouba, 2011, pp. 487–499).[66] Before one can approach the analysis itself it is important to calibrate the data according to their membership in the set. Therefore, it is necessary to set at least three points: maximum fuzziness and full membership or non-membership (Schneider & Wagemann, 2012, pp. 28–32). The calibration of conditions used in this thesis is discussed in Ch. 5.3 while other steps and important tables are provided in Ch. 6 and in the appendix. In general, this thesis follows the general framework and formal steps mentioned above. Another very important step in QCA is also the choice of the solution, as the software always offers three possible versions: complex (CS), intermediate (IS), or parsimonious (PS). It is a common custom to report all of them (see the Appendix) while discussing only the intermediate, which is rather preferred (Schneider & Wagemann, 2012, 174–175; Dușa, 2022, pp. 542–543). The reason is that

[66] For a deeper discussion of the steps, see the various chapters by Rihoux and Ragin (2009a) or Schneider and Wagemann (2012).

> [t]he intermediate solution term is also in between the conservative and the most parsimonious solution in terms of complexity. The rationale for creating intermediate solution terms is that, on the one hand, the conservative solution often tends to be too complex to be interpreted in a theoretically meaningful or plausible manner and that, on the other hand, the most parsimonious solution term risks resting on assumptions about logical remainders that contradict theoretical expectations, common sense, or both. (Schneider & Wagemann, 2012, p. 175)

However, this fact was recently questioned by Alrik Thiem (2022), as we will see in the chapter below on the criticism and problems of QCA. However, this research sticks rather with intermediate solutions, as it still seems more preferable by various authors (Ragin, 2008; Schneider & Wagemann, 2012; Legewie, 2013; Hossu et al., 2018; Duşa, 2022). There are also two rather methodological reasons. The first raised by Hossu et al. (2018, p. 833) as QCA-IS "is less affected by the problem of limited diversity specifically." The second reason lies in the characteristic pattern of QCA-IS that is based on theoretical knowledge as it is "using theory as a guide as to which logical remainders should be assumed to have a link to the outcome" (Schneider & Wagemann, 2012, p. 175). Therefore, due to the fact that this thesis draws from strong theoretical knowledge and follows what is closer to the "substantive interpretability" approach, the QCA-IS solution is preferable (Haesebrouck & Thomann, 2022).

Particular attention is also dedicated to a post-QCA analysis, where various robustness checks are applied which could be found in Ch. 6. Also, for this method, it is appropriate to discuss different cases that are part of the solution and paths. This is also done after the formal choice of the best suitable cases in Ch. 7.1. However, the cases discussed should not be taken as sole case studies, but rather as an illustrative and brief discussion of the cases derived from QCA.

5.2 Is QCA safe to use?

Recently, this method has also received a high level of attention in security studies and conflict research (see, for example, Řehák, 2011; Mochťák, 2013; Mello, 2014; Ide, 2015; Schmiedl & Prouza, 2021) as well as in the study of democratic and authoritarian regimes (see, for example, Bílek, 2017, 2018; Schneider & Maerz, 2017; Maerz, 2020). In the

Czech environment, the use of the method is still rather exceptional. We can mention works by Řehák (2011), Mochťák (2013), Váňa (2014), Bílek (2017; 2018), Bláha and Maškarinec (2020), Fridrichova and Havska (2020) or Schmiedl and Prouza (2021). As the method is being used more and more, its merits and pitfalls and possible problems are being discussed more and more as well.

The reason is that QCA is sometimes under heavy criticism, and many mechanics and good practises are also deeply discussed among the main propagators of it. One of the main discussions is about the proper application of the method. Generally, authors argue about the proper thresholds, the solving of problematic cases, or recently the type of the most preferred solution type (e.g., Tanner, 2014; Hug, 2013; Thiem, 2022; Hossu et al., 2018). In their amazing overview of the current application of QCA in the field of IR, Ide and Mello (2022) show how diverse authors more or less follow formal practise. However, they also show how big the amount of diversity could be found, for example, in thresholds for consistency, coverage, used solution types or robustness tests which are, for example, still rare.

Ide and Mello (2022) for example highlight that one of the most important aspects of the method is transparency. The reason is that the method is sensitive to case selection and its number due to condition-cases ratio. Similarly, it is important to highlight the question of calibration which is one of the most sensitive steps in QCA and often offers space for "manipulation by the researcher" (Ide & Mello, 2022, p. 11). Even though the method brings many important advantages, some authors criticise its use in their fields due to some of its characteristics. For example, Sean Tanner (2014, pp. 295–297) shows that the method is not appropriate for the use in policy research due to its deterministic character or rejection of "net-effects." Simon Hug (2013) problematised the missing error measurement in the case of QCA. The criticism of Samuel Lucas and Alisa Szatrowski (2014) is going so far that they argue for rejection of the method as a whole.

> […] QCA fails to find correct causal recipes, fails to replicate causal recipes across data sets that differ only owing to chance, identifies causal patterns in noncausal data, does not find the correct causal patterns in deterministic data, finds interactions even when they are absent, fails to find the correct interactions when interactions are present, selects the wrong direction of

> association, and finds asymmetric causation when the known causal structure is symmetric. (p. 3)

Obviously, this is a very strong claim that was also supported by Jason Seawright (2014, p. 121) who also argues for abandoning the method in favour of a different one. However, conclusion of Lucas and Szatrowski (2014) is also heavily criticised by Charles Ragin (2014) in his response to the authors. He shows errors in their approach and a misunderstanding of the nature of QCA.

The method is still very young and suffers from weaknesses, which are however not exceptional for other more traditional approaches (Schmiedl & Prouza, 2021, p. 32). In addition, the best practise is forwarded by different authors year-by-year, and the debate among them actually strengthens the method and shows that users react to weak spots. In addition, the debate further shows that there are no dogmas in the practise of the method that can move forward instead of only "hovering." Although the "best practise" exists in this method, the role of the researcher is very important (we will see below that it is the researcher who decides) which leads us again to the above-mentioned transparency. Hence, to answer the question in the title: Yes, the method is safe to use; however, the researcher has to know its limits, weaknesses but also advantages, and should be transparent as much as possible.

5.3 Data and Operationalization

This dissertation focuses on six conditions in QCA that are chosen on previous theoretical and empirical knowledge. In climate change vulnerable countries, the set-theoretical influence of four of them is investigated in both, violent civil conflicts and violent inter-communal conflicts. The dissertation, therefore, explores African countries vulnerable to climate change in the time horizon between 2000 and 2017. Each condition is calculated on the state level for the monitored years (2000-2017)[67] and is presented as the value of the condition per year (average for the period), except regime instability. Therefore, there are 12 cases out of which some are very conflictual, some less, and some are more or less

[67] The only exception is Access to Land as by the time of the calculation there were only data for the period of 2000-2016. In case of Access to Land, data for Sudan have been calculated with the use of data on the population (World Bank, 2020d) and Arable land (hectares) (World Bank, 2020e). By the time of writing, only for 2011–2016.

peaceful. As for conflict in case of violent civil conflicts, a narrow definition of conflict episodes of conflicts between state and rebels with or without outside intervention is used. In the case of violent inter-communal conflicts, a narrow definition of inter-communal violent conflicts as conflicts between two communities is similarly employed. These operational definitions are based on the ACLED database and the dataset from 2019 (ACLED, 2019; 2020; Raleigh et al. 2010) and their coding of diverse conflicts.[68] As for all other conditions, except political equality, conflicts are calibrated with the use of the z-score.[69] This means that the point of full membership and full non-membership is calibrated at the standard deviation 1.645 and -1.645, respectively, and the point of maximum fuzziness is at the standard deviation 0. Although z-score is not the best possible way for calibration, it is used by diverse authors (e.g., Pennings, 2005; Mello, 2014; Woodside, 2015; Bílek, 2018; Bílek, 2017) or even recommended as a suitable method for calibration if there are no clear qualitative anchors (Kouba, 2011). In the analysis, it is important to think about possible weaknesses of calibration.

In case of the condition *oil dependence*, this research uses data from the World Bank (2020i). *Political equality*, is based on the variable from Varieties of Democracy (Coppedge et al., 2019; Coppedge et al., 2019a; Pemstein et al., 2019) "Power distributed by social group". This variable identifies the distribution of power among different social groups. The more the groups are marginalised, the lower the value is. This condition is the only one to be calibrated according to a priori theoretical knowledge. Therefore, the calibration follows the scale of the Varieties of Democracy, which is from 0 to 4 (Coppedge et al., 2019a; Pernstein et al., 2019). In the calibration, value 3 is used as full membership, 2.5 is the point of maximum fuzziness, and 1 as full non-membership. For *regime instability*, the number of regime changes during the years is used and operationalised through the variable "Regime Durability" from the Polity 5 by The Integrated Network for Societal Conflict Research (INSCR, 2019) which counts "[t]he number of years since the most recent regime change" (Marshall et al., 2020, p. 17). This

[68] Therefore, for civil conflicts, the dissertation focuses on violence between rebels and the state which is civil war in its basic definition or potentially a state that supports a home state. In the case of inter-communal conflicts, the focus is clearly on violence between at least two communal groups. The difference between these two is not in the intensity of conflict but in the purpose and goals. Rebels have a clear goal which goes against state power while the identity group lacks this feature (ACLED, 2019, pp. 20–27).

[69] As it is visible in case of hypotheses because of the use of the z-score, this dissertation uses the words "rather" or "relatively."

variable is also calibrated with the use of the z-score. *Access to land* is operationalised as the average amount of arable land in hectares per capita according to data from the Food and Agriculture Organization aggregated by the World Bank (2020f). Access to water is measured through the indicator "People using at least basic drinking water services (% of population)" by the WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply, Sanitation and Hygiene aggregated by World Bank (2020g). *Urbanisation* is measured as the change of urban population against the previous year. This is done with the use of the indicator Urban population (% of total population) by the United Nations Population Division aggregated by the World Bank (2020h).

6 Incidence of Violent Internal Conflicts in Climate Change Vulnerable States

In case of QCA, the first step is always the necessity test followed by the test of sufficiency for both the presence (high incidence) and absence of the outcome (low incidence). Since this research expects that violent civil conflicts and inter-communal conflicts have a slightly different set of conditions leading to both the presence and absence of outcome, the analysis is done separately. In case of both, tests of robustness will also be done and typical and deviant cases (see Ch. 7) will be shown. This chapter answers the question of why some climate change-vulnerable countries suffer from a higher incidence of violent conflicts than others. Therefore, it is the first step to understand why climate change vulnerability transforms into conflicts and others not in some cases.

6.1 Violent Civil Conflicts

In case of violent civil conflicts, for the test of necessity we realise that marginalisation (~EQL) is a necessary condition for a high incidence of violent civil conflicts (see Table 3). This condition was the only one that passed consistency level 0.9. Interestingly, regime stability (~REG) almost passed the threshold for necessity in case of absence of outcome with an approximate consistency of 0.88. Therefore, right from the beginning we can observe an important position of marginalisation in case of violent civil conflicts.

Table 3 Test of Necessity - Violent civil conflicts

Outcome variable: CW			Outcome variable: ~CW	
Condition tested	Consistency	Coverage	Consistency	Coverage
OIL	0.696226	0.705545	0.547761	0.701721
~OIL	0.705660	0.552437	0.770149	0.762186
REG	0.820755	0.841393	0.555224	0.719536
~REG	0.726415	0.563690	0.877612	0.860908
LAN	0.660377	0.667939	0.638806	0.816794
~LAN	0.818868	0.642012	0.740299	0.733728
EQL	0.375472	0.508951	0.540299	0.925831
~EQL	**0.945283**	0.619283	0.713433	0.590853

(Created by the author in the software FS/QCA 3.1 by Ragin & Davey, 2019)

The first step in the case of sufficiency is generating the truth table on the basis of fuzzy-set membership.[70] There are one or two possible ways for presence (see Table 5) and three for absence of outcome (see Table 7).[71] As mentioned in the previous chapter, the focus is on an intermediate solution.[72]

Table 4 Truth Table for Positive Outcome – Violent civil conflicts

OIL	REG	LAN	EQL	Number	CW	cases	consist.	PRI consist.	SYM consist
1	0	0	0	1	1	Nigeria (0.59, 0.55)	0.924901	0.344828	0.4
0	1	0	0	2	1	Somalia (0.74, 1); Burundi (0.74, 0.55)	0.901235	0.724138	0.865979
1	0	1	0	2	0	Chad (0.66, 0.26); Sudan (0.65, 0.68)	0.85	0.392857	0.392857
0	1	1	1	1	0	Niger (0.59, 0.24)	0.79803	0.18	0.18
0	0	0	0	4	0	Ethiopia (0.65, 0.57); Malawi (0.55, 0.22); Kenya (0.65, 0.26); Uganda (0.65, 0.53)	0.662577	0.153846	0.181818
0	0	0	1	2	0	Mozambique (0.60, 0.22); Lesotho (0.74, 0.22)	0.520661	0	0

(Created by the author in the software FS/QCA 3.1 by Ragin & Davey, 2019)

[70] A complete table with fuzzy-set membership is in the Appendix.

[71] We can see that political marginalisation is clearly a necessary condition. Previously, Ragin (2006, p. 43; 2009, p. 110) proposed a possible omitting of the necessary condition from the test of sufficiency while using this condition later as relevant for all pathways. However, this recommendation is not mentioned by other scholarship on QCA and neither in the latest fsQCA manual (Ragin, 2018). Still, in the case of omitting the condition EQL from the truth table analysis, the solution will remain REG*~LAN → CW (with almost absolutely same values of consistency and slightly higher coverage). When we add ~EQL into the solution it remains the same. Therefore, in sufficiency calculation and even in the following tests of robustness condition, EQL was included.

[72] Complete results (complex and parsimonious solutions) are in Appendix 2.

In case of a high incidence of violent civil conflicts (CW), the first path possibly could be the conjunctural term, which consists of a relatively high oil dependence, land scarcity, and marginalisation (OIL*~LAN*~EQL → CW). However, it was decided to exclude this path due to the simultaneous presence of a row with Nigeria in the presence and absence of outcome. This is done through checking the value of PRI whose value in general helps to "avoid simultaneous subset relations of configurations in both the outcome and its absence" (Greckhamer, Furnari, Fiss & Aguilera, 2018, p. 489). The solution of this problem and the low PRI value is always at the final discretion of the researcher. As the problem with the possible solution membership of Chad and Sudan is solved by a higher consistency threshold used in analyses of the presence of outcome, it was decided to keep them in the calculation, even though Sudan in this case is valued as 0 in the case of absence of outcome, even though it is clearly a highly conflictual example of the country and therefore a deviant case. However, in case of the Nigeria row (conjunction), it could possibly stay in both the presence and absence of the outcome. In the case of the weight of the PRI value, if one follows Schneider and Wagemann (2012, p. 243) it is rather suggested that the row should stay in the analyses of the absence of outcome as it shows a higher value, however, empirically and logically saying that it makes more sense to have it as a solution for the presence of outcome (ibid., p. 244). This discrepancy leads us to rather keep Nigeria out of the QCA minimisation in both the presence and absence of outcome. However, as we shall see, it would be a logical case for the presence of outcome, therefore, the case was included in further discussion without inclusion in minimisation. [73] A similar problem could possibly occur in the case of Chad and Sudan, however, as mentioned this was solved by a higher consistency level and in

[73] The case of Nigeria is a very interesting example for the role of the interaction of climate change and other conditions and conflicts as many authors connect Boko Haram's rise to climate and environmental change around Lake Chad and poverty, inequality and state weakness (see Ubhenin, 2012; Onuoha, 2010; Rizzo, 2015; Ukiwo, 2013; Akinola, 2015; Agbiboa, 2013). This would further support the solution term for the presence of violent civil conflict as a great dependence on oil is very often connected to a fragile economy and conflicts (Ross, 2004, 2015) that with the current situation when Lake Chad Basin is a clear-cut example of climate change resource issues combined with marginalisation this would further support the conclusion based on the term OIL*~LAN*~EQL → CW. However, it is also important to mention that further analysis of Nigeria as a typical case is problematic according to Schneider and Rohlfing (2013) as it is not a typical case according to the plot. The reason behind this could be the measurement error which is not very often taken into account in the case of QCA (Eliason & Stryker, 2009). This could lead to not absolutely precise calibration and therefore is the reason why Nigeria is not a typical but deviant case in the main model while in the recalibrated model it could be a typical case of the same solution. Even with this in mind, it is better for analysis to exclude the rows from minimization in both cases due to low PRI consistency values.

the case of absence of outcome, these cases had a decent PRI value that directs us to keep it as a row for absence of outcome. However, it leads to the situation that Sudan is a clear deviant case in the type of particular path. This problem will be discussed further below.

Therefore, the only term for the presence of a rather high incidence of violent civil conflicts is the path that combines relatively high regime instability, land scarcity, and marginalisation (REG*~LAN*~EQL → CW). This path covers two cases and could be called the Somalian path as Somalia is a typical case for this in this combination. The solution formula REG*~LAN*~EQL → CW has relatively good coverage 0.7 and satisfactory consistency 0.9 when not counting with the Nigerian case and recalculation of solutions (see Table 5).[74]

Table 5 Test of Sufficiency for Presence of Outcome - Violent civil conflicts[75]

INTERMEDIATE SOLUTION - CW				
frequency cutoff:	1			
consistency cutoff:	0.901235			
	raw coverage	unique coverage	consistency	Cases in term
REG*~LAN*~EQL	0.666038	0.666038	0.907455	Somalia (0.81,1), Burundi (0.78,0.55)
solution coverage:	0.666038			
solution consistency	0.907455			

(Created by the author in the software FS/QCA 3.1 by Ragin & Davey 2019)

In the case of absence of outcome, hence, a rather low incidence of violent civil conflicts three terms in the solution occur. As mentioned above, as in the case of analysis of presence, the Nigeria row with low PRI consistency was rather excluded from further minimization. The first one combines a relatively stable regime and a rather high amount of arable land (~REG*LAN → ~CW).

[74] Due to the omitted truth table row, there is only one term which means that neither condition is INUS. Even though three conditions are solely insufficient while being necessary parts of the term, the term is necessary as the only term in the solution.

[75] In case we were to keep the Nigeria row in the minimization, it would lead to one new solution which is mentioned above. Also, the coverage would raise to 0.70 and consistency would slightly change to 0.88.

Table 6 Truth Table for Absence of Outcome - Violent civil conflicts

OILK	REGK	LANK	EQLK	number	~CWK	cases	consist.	PRI consist.	SYM consist
0	0	0	1	2	1	Mozambique (0.6, 0.78); Lesotho (0.74, 0.78)	1	1	1
0	1	1	1	1	1	Niger (0.59, 0.76)	0.955665	0.82	0.82
1	0	0	0	1	1	Nigeria (0.59, 0.45)	0.944664	0.517241	0.6
1	0	1	0	2	1	Chad (0.68, 0.74), Sudan (0.65, 0.32)	0.902941	0.607143	0.607143
0	0	0	0	4	0	Ethiopia (0.65, 0.43); Malawi (0.55, 0.78); Kenya (0.65, 0.74); Uganda (0.65, 0.47)	0.877301	0.692308	0.818182
0	1	0	0	2	0	Burundi (0.74, 0.45); Somalia (0.74, 0)	0.682099	0.112069	0.134021

(Created by the author in the software FS/QCA 3.1 by Ragin & Davey 2019)

The second path combines a relatively stable regime with relatively equal access to power and the absence of oil dependence (~OIL*~REG*EQL→CW). Therefore, the society in such a state has less marginalised groups. This means that the most of the important social groups is included in power sharing. The regime is also very stable and not dependent on oil, which would provoke greed or grievance or make the state an easy target for rebels. Last but not least, there is the "Nigerien" path, which combines a rather low dependence on oil and access to land with relatively equal society (~OIL*LAN*EQL → ~CW). All these conditions rather save the country from a high incidence of conflicts even in a situation of climatic disasters or climate change influence. This case is an interesting case from the point of view of the inclusion of all-important segments of society. The reason is that Niger is very often used as an example where the inclusion of the Tuareg helped to avoid conflict (e.g., Kisangani, 2012; Schmiedl, 2019a). Together, the solution formula ~REG*LAN + ~OIL*~REG*EQL + ~OIL*LAN*EQL→ ~CW has relatively satisfactory coverage 0.7 and very high consistency 0.9 (see Table 7).

Table 7 Test of Sufficiency for Absence of Outcome - Violent civil conflicts

INTERMEDIATE SOLUTION - ~CW				
frequency cutoff:	1			
consistency cutoff:	0.902941			
	raw coverage	unique coverage	consistency	Cases in term
~REG*LAN	0.573134	0.270149	0.920863	Chad (0.68,0.74), Sudan (0.65,0.32)
~OIL*~REG*EQL	0.420896	0.11791	1	Lesotho (0.74,0.78), Mozambique (0.6,0.78)
~OIL*LAN*EQL	0.350746	0.0477612	0.963115	Niger (0.67,0.76)
solution coverage:	0.738806			
consistency:	0.921788			

(Created by the author in software FS/QCA 3.1 by Ragin & Davey, 2019)

In order to test robustness, this dissertation follows logic used by Schneider and Wagemann (2012) or Ide (2015) and five different models' specification were run (see Table 8).[76] The first one focuses on the consistency threshold. In general, we can test robustness on the basis of the "differences in the parameters of fit and the set-relational status of the different formulas" (Schneider & Wagemann, 2012, p. 286). In the case of parameters, due to the relatively low number of cases (12) there is relatively no space to test for a higher frequency threshold greater than 1 (Ragin, 2018, p. 53; Ragin, 2009, pp. 106–107). The same situation is in the case of a higher consistency threshold, for which the threshold 0.9 was already used. However, we can test a lower consistency level. In this sense, it is good to check the truth table for possible natural thresholds (Ragin, 2008 in Schneider & Wagemann, 2012, p. 292), in the case of the presence of outcome 0.85 and absence 0.87. In this case, for the presence of outcome, the solution remained the

[76] In cases that needed the above-mentioned PRI consistency rules were followed and a decision about the inclusion/exclusion of rows with very low consistency that signalled mutual presence in both negative and positive solution was made.

same with the same consistency and coverage (see Table 8).[77] In case of absence, it has a visible effect on the solution consistency level which while dropped it is still over 0.75, however, coverage of the solution is higher. However, these are general effects of a lower consistency threshold (Schneider & Wagemann, 2012, p. 291). Importantly, the solution remained the same.

In other tests, similarly to Ide (2015), different condition were dropped or added.[78] In the second test, the condition that is tested in the case of inter-communal conflicts, access to water (WAT), was added as one could suggest that access to water could also play a role in violent civil conflicts. As we can generally see, for the presence of the outcome, the solution formula is very similar; even though the presence of the water condition was part of a new term, the second term remained identical with the addition of rather poor access to water. In the absence of outcome, all three terms remain strong; however, one new term occurred. This supports the robustness of the main model. However, in the case of an added condition, the problem of random consistent results could appear (Marx & Dușa, 2011; Ide, 2018, p. 831). This is contested and questioned, as this problem was tested only in the case of cs/QCA (Hossu et al., 2018, p. 833). Nevertheless, there is no general rule even though the number of conditions tested should be rather low in case of small-N and intermediate-N inquiry (Berg-Schlosser & De Meur, 2009, p. 28). Therefore, this test could be used with caution.

Table 8 Robustness Tests – Violent civil conflicts

	CW	Consist.	Coverag.	~CW	Consist.	Coverag.
main	REG*~LAN*~EQL	0.91	0.67	~REG*LAN + ~OIL*~REG*EQL + ~OIL*LAN*EQL	0.92	0.74
Lower threshold	REG*~LAN*~EQL	0.91	0.67	~REG*LAN + ~OIL*~REG + ~OIL*LAN*EQL	0.88	0.9
Condition added (WAT)	~EQL*(OIL*WAT+REG*~LAN*~WAT)	0.97	0.78	~REG*(LAN*~WAT+ ~LAN*WAT*~OIL)+ ~OIL*EQL*(~REG*+ *LAN)	0.97	0.77

[77] The reason is that that other two rows that pass the raw consistency were not suitable due to rather low PRI consistency.

[78] In all cases, the consistency threshold 0.9 was used if not explicitly mentioned.

Condition dropped (OIL)	REG*~LAN*~EQL	0.91	0.67	~REG*LAN+~REG*EQL+LAN*EQL	0.92	0.76
Condition dropped (REG)	OIL*~LAN*~EQL	0.93	0.52	~OIL*EQL	0.97	0.47
Cases added (Mali)	REG*~LAN*~EQL	0.91	0.62	~OIL*EQL * (~REG+LAN)	0.97	0.52

(Created by the author in the software FS/QCA 3.1 by Ragin & Davey 2019)

However, the test was also run with a drop in the number of conditions for this reason. In this case, regime instability and oil dependence have been dropped. In both cases, this led to the support of the robustness of the main model in the presence of outcome even though we can observe a logical decrease in the case of coverage. A similar situation occurred in the case of the absence of outcome. Here, the reduction was much bigger in case of omitting regime instability. In the case of oil dependence as an omitted condition, there is no change.

Last but not least, the test was run with one added case – Mali. In the case of Mali, as the Sahelian state, sometimes it is also argued that conflicts happened there due to climate change and resource scarcity, even though that is contested (e.g., Benjaminsen, 2008; Benjaminsen et al., 2012). In case of the presence of outcome, the solution remained the same with almost identical consistency and coverage. For absence of outcome, two out of the three terms remained in the solution while coverage slightly dropped. However, this also more likely supports the robustness.[79]

To conclude, the results seem to be mostly robust with these changes. As we know that marginalisation is necessary for high conflict incidence, marginalisation also appeared as important as part of sufficient solutions among diverse models. However, real confidence could be built through further discussion of them in the chapters where the thesis discusses typical cases.

[79] Another conventional method would be dropping cases, however, as the case selection was done according to restrictive selections and there is already a rather small number of them, another reduction of cases would be rather more problematic from the point of view of the few cases, many variables problem even though there is no general rule for the number of cases and variables in case of four conditions. Still, the decision was made to keep the number of cases at 12, even though some authors accept four conditions for 10 cases. For discussion of this problem, see, Berg-Schlosser & De Meur (2009), Ide (2018), Hossu et al. (2018), Marx & Duşa (2011) or Bílek (2018).

6.2 Inter-communal Violent Conflicts

In case of inter-communal violent conflicts, again, the analysis begins with a test for necessity for both presence (rather high incidence) and absence (rather low incidence) of outcome. After a brief look at Table 9, we realize that none of the conditions is necessary for the outcome. However, it is worth mentioning that marginalisation in case of a high incidence of inter-communal violent conflicts is just slightly below the threshold of 0.9. This could again show the importance of equal access to power.

Table 9 Test of Necessity – Inter-communal Conflicts

Outcome variable: COM			Outcome variable:~COM	
Conditions tested	Consistency	Coverage	Consistency	Coverage
LAN	0.656075	0.669847	0.590977	0.750000
~LAN	0.755140	0.597633	0.739850	0.727811
WAT	0.702804	0.639456	0.593985	0.671769
~WAT	0.639252	0.558824	0.681203	0.740196
URB	0.786916	0.723368	0.565414	0.646048
~URB	0.614953	0.532362	0.757895	0.815534
EQL	0.375701	0.514067	0.503759	0.856777
~EQL	0.895327	0.592089	0.714286	0.587145

(Created by the author in the software FS/QCA 3.1 by Ragin & Davey, 2019)

Again, as the first step, the truth table was generated (see Table 10). In the case of sufficiency for high incidence of violent inter-communal conflicts, we can identify two paths (see Table 11). In the first path LAN*WAT*~EQL → COM, it is the combination of marginalisation, the abundance of arable land and the abundance of water that leads to conflicts. It could seem surprising; however, the decisive factor could be marginalisation that shapes the relative absence of scarcity into scarcity. Unequal access to power could lead to poor access to land and water even though in absolute numbers there is a relatively high amount of both. This way could be called the Sudanese path. A similar explanation could work in the path with a relative abundance of water, high urbanisation rates, and marginalisation (WAT*URB*~EQL → COM). Again, marginalisation could be an important part of explanation. However, in this case conflicts could appear in urban areas, which could make urbanisation and rural-urban migration important for the pressure on resources. Typical cases in this solution are Nigeria and Kenya, which suffer from urban violence, but also from farmer-herder conflicts. Together, the solution WAT*~EQL*(LAN+URB) → COM has coverage 0.6 and consistency 0.9. To conclude,

just from this result, marginalisation appears again to be an important contributor to inter-communal conflicts. This could particularly appear as important in the case of countries vulnerable to climate change.

Table 10 Truth Table Presence of Outcome - Inter-communal Conflicts

LAN	WAT	URB	EQL	number	COM	cases	consist.	PRI consist.	SYM consist
0	1	1	0	2	1	Kenya (0.59, 0.66); Nigeria (0.59, 0.88)	0.947791	0.867347	0.867347
1	1	0	0	1	1	Sudan (0.61, 0.78)	0.922131	0.712122	0.712121
0	0	0	0	1	0	Ethiopia (0.54, 0.40)	0.834025	0.166667	0.166667
0	0	1	0	2	0	Somalia (0.81, 0.99); Uganda (0.65, 0.29)	0.821428	0.574468	0.574468
1	0	0	0	1	0	Chad (0.68, 0.24)	0.793103	0.294117	0.294117
0	0	1	1	1	0	Mozambique (0.54, 0.22)	0.792208	0.219512	0.219512
0	1	1	1	1	0	Lesotho (0.74, 0.22)	0.761468	0.41573	0.41573
0	1	0	0	2	0	Burundi (0.65, 0.22); Malawi (0.55, 0.22)	0.694779	0.164835	0.164835
1	0	0	1	1	0	Niger (0.67, 0.23)	0.680851	0.117647	0.117647

(Created by the author in the software FS/QCA 3.1 by Ragin & Davey, 2019)

For absence of outcome (rather low incidence), the truth table is again generated (see Table 12). In case of sufficient conditions, three different pathways exist. However, in all three paths the conditions seem to go mostly against theoretical expectations. In the case of the first path, it combines a relative scarcity of water resources and low urbanisation rates (~WAT*~URB → ~COM). This is surprising particularly in countries highly vulnerable to climate change, and where climatic disasters could often be further highlighted by urbanisation and bad water infrastructure. In a situation of water scarcity and a rural population, it seems that people probably do not fight. The explanation could lie in a "cooperation argument". Simply, there is not much to fight for and people prefer to cooperate (Theisen, 2012, p. 93).

Table 11 Test of Sufficiency Presence of Outcome - Inter-communal Conflicts

INTERMEDIATE SOLUTION - COM				
frequency cutoff:	1			
consistency cutoff	0.922131			
	raw coverage	unique coverage	consistency	Cases in term
LAN*WAT*~EQL	0.499065	0.149533	0.933566	Sudan (0.61,0.78)
WAT*URB*~EQL	0.452336	0.102804	0.94902	Nigeria (0.59,0.88), Kenya (0.59,0.66)
solution coverage:	0.601869			
solution consistency:	0.909604			

(Created by author in software FS/QCA 3.1 by Ragin & Davey, 2019)

However, the cases in this path overlap partially with the path that consists of water scarcity and relatively equal society (~WAT*EQL → ~COM). The case that is present in both paths is Niger. Therefore, maybe equality is once again an important condition.

The last path to mention combines land scarcity and low urbanisation rates (~LAN*~URB → ~COM). Similarly to the above-mentioned paths, one condition influences conflict absence in a surprising way. Although there is a low rate of urbanisation, hence this follows the expectation, particularly in case of land scarcity, one would expect that the population moves from rural areas to urban ones to find a new livelihood. Therefore, not only that we would expect a different direction of land in case of conflict absence, but we would expect even a different way of influence in case of urbanisation rates. Once again, the cooperation argument seems to be perhaps plausible. To conclude, the solution for the low incidence of violent inter-communal conflicts ~WAT*~URB + ~WAT*EQL+ ~LAN*~URB → ~COM has a coverage of 0.75 and a consistency of 0.93.

Table 12 Truth Table - Absence of Outcome - Inter-communal Conflicts

LAN	WAT	URB	EQL	number	~COM	cases	consist.	PRI consist.	SYM consist
0	0	0	0	1	1	Ethiopia (0.54, 0.6)	0.966805	0.833333	0.833333
1	0	0	1	1	1	Niger (0.67, 0.77)	0.957447	0.882353	0.882353
0	0	1	1	1	1	Mozambique (0.54, 0.78)	0.941558	0.780488	0.780488
0	1	0	0	2	1	Burundi (0.65, 0.78); Malawi (0.55, 0.78)	0.939759	0.835165	0.835165
1	0	0	0	1	1	Chad (0.68, 0.76)	0.913793	0.705883	0.705883
0	1	1	1	1	0	Lesotho (0.74, 0.78)	0.830275	0.58427	0.58427
1	1	0	0	1	0	Sudan (0.61, 0.22)	0.807377	0.287879	0.287879
0	0	1	0	2	0	Somalia (0.81, 0.01); Uganda (0.65, 0.71)	0.758929	0.425532	0.425532
0	1	1	0	2	0	Kenya (0.59, 0.34); Nigeria (0.59, 0.12)	0.658634	0.132653	0.132653

(Created by the author in the software FS/QCA 3.1 by Ragin & Davey 2019)

One specific issue, however, could be the reason for this inconsistency with theoretical expectations. The problem could be the local context and use of state-level data. Simply put, inter-communal conflicts are very specific and sensitive to the local context that could be hard to catch with state-level data on land or water. Therefore, we have to deal with the often-difficult issue of the data. Although cases for absence of inter-communal violent conflicts will not be further discussed, for formal reasons it is important to present the results of analyses.

Similarly to civil conflicts, the test for several different models to support the robustness of the model was run (see Table 14). As in the case of violent civil conflicts, the model with a lower raw consistency threshold was tested.[80] As expected in both cases, coverage increased while the consistency decreased (in both situations stood above 0.75). In the case of the solutions, slight changes appeared. In the case of a high incidence of conflicts, two paths appeared as the same; however, one more path based on typical

[80] Similarly, the natural gap method was used. In this case for presence of outcome 0.8 and for absence 0.83 (the next possible would be 0.8)

resource scarcity arguments appears (the typical case for this path would be Somalia). The solution to the low incidence of conflicts appeared to be very similar. However, one change appeared in the case of the last path. The equality is now not an INUS condition as it is solely sufficient.

Table 13 Test of Sufficiency for Absence of Outcome - Inter-communal Conflicts

INTERMEDIATE SOLUTION - ~COM				
frequency cutoff:	1			
consistency cutoff:	0.913793			
	raw coverage	unique coverage	consistency	Cases in term
~WAT*~URB	0.538346	0.0781955	0.92987	Chad (0.78,0.76), Niger (0.67,0.77), Ethiopia (0.54,0.6)
~LAN*~URB	0.536842	0.17594	0.959677	Burundi (0.65,0.78), Malawi (0.59,0.78), Ethiopia (0.54,0.6)
~WAT*EQL	0.326316	0.0360902	0.960177	Niger (0.67,0.77), Mozambique (0.6,0.78)
solution coverage:	0.750376			
solution consistency:	0.934457			

(Created by the author in the software FS/QCA 3.1 by Ragin and Davey 2019)

In the model with the added condition, the solution for a high incidence of inter-communal conflicts is rather the same with one new path. However, in the case of the absence of outcome, we can observe several changes, even though there are similarities. This could be caused by a high number of logical remainders. Although QCA-IS partially reduces this problem, as mentioned above (Hossu et al., 2018, p. 833) we should take these results with great hesitation.

In case of omitting conditions, the results are expected to led to the reduction of the solution path. Just in the case of omitted urbanisation, this led to a higher decrease in the case of coverage that could show the importance of this condition for the explanation of more cases. More importantly, in the model with the added case of Mali, this led to a

similar solution and almost identical coverage and consistency. In the case of a low incidence of conflicts, this led to the reduction of the solution's paths from three to two. However, these two are very similar and would not lead to a big change in the interpretation of the solution. Rather, it linked the two solutions.

Table 14 Robustness Tests - Inter-communal Conflicts

	COM	Consist	Coverag.	~COM	Consist	Coverag.
main	WAT*~EQL*(LAN+URB)	0.9	0.6	~WAT*~URB+~LAN*~URB+ ~WAT*EQL	0.93	0.75
Lower threshold	~EQL*(LAN*WAT+ ~LAN*~WAT+WAT*URB	0.78	0.83	~WAT*~URB+~LAN*~URB+EQL	0.87	0.84
Condition added (REG)	~EQL*(LAN*WAT+WAT*URB+ ~LAN*URB*REG)	0.92	0.82	~REG*~WAT+~LAN*WAT*~URB +LAN*~WAT*~URB*EQL	0.94	0.85
Condition omitted (URB)	LAN*WAT*~EQL	0.93	0.5	~WAT*EQL	0.96	0.32
Condition omitted (LAN)	WAT*URB*~EQL	0.94	0.45	~WAT*(~URB+EQL)	0.93	0.57
Case added (Mali)	WAT*~EQL*(LAN+URB)	0.93	0.53	~WAT*~URB*(~LAN+EQL)	0.96	0.48

(Author)

To conclude, in the case of the robustness of violent inter-communal conflicts, it is harder. A big change appeared in the case of one more condition included, however, this could be the result of too high numbers of logical reminders. However, one significant pattern always appeared, equality or otherwise, marginalisation. The results seem to further support the importance of marginalisation or equality for conflictual development in the case of countries vulnerable to climate change. In general, the solution for the presence of conflicts will be discussed with the use of cases that should help to accept or decline the solution. As formally accepted, cases for the absence of outcome will not be deeply analysed.

7 Post-QCA Analysis - Discussion, Illustrative Cases and Problems

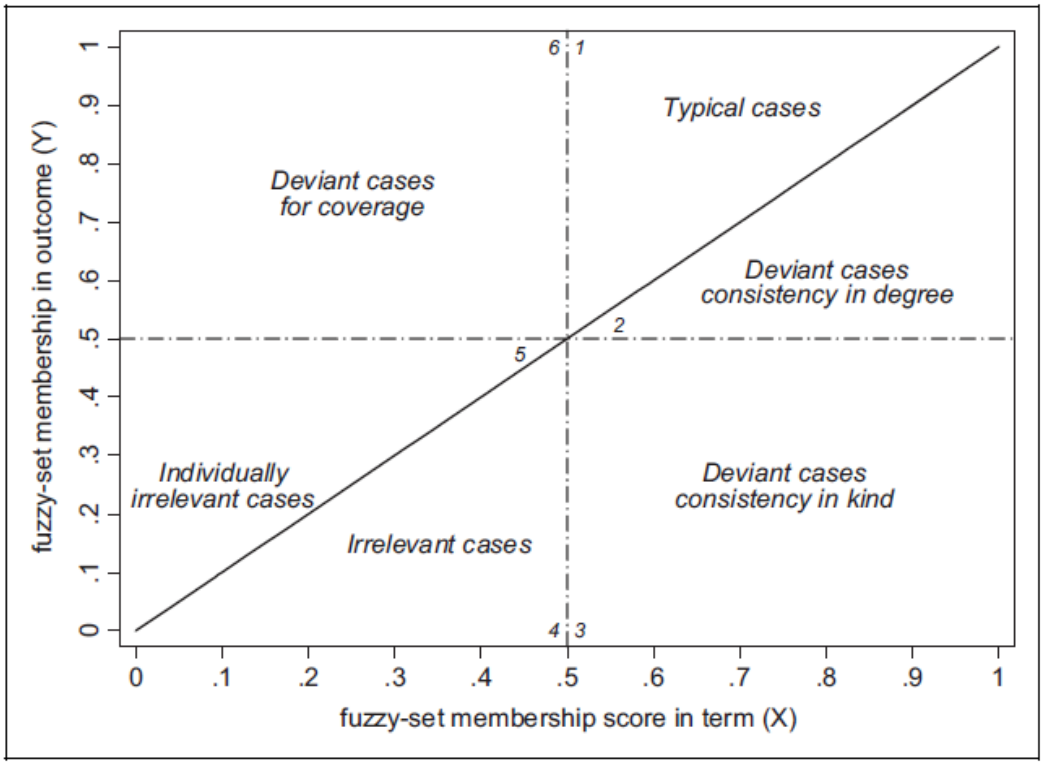
The goal of this chapter is to focus on a further interpretation of solutions calculated in a QCA. A post-QCA analysis with respect to cases is an important part of the interpretation (Schneider & Rohlfing, 2016, p. 527; Rihoux & De Meur, 2009, p. 65). The cases can be useful for further analysis of the mechanism of the typical cases or to point at the paths that were not enquired. Therefore, this aim of the chapter is to focus on the solutions presented in the previous chapter. A proper choice of cases to discuss should help further confirm or falsify the models.

In general, the work with cases is an important step in the case of QCA (Schneider & Rohlfing, 2013, pp. 560–564). However, with a few exceptions (e.g., Schneider & Wagemann, 2012; Schneider & Rohlfing, 2013; 2016, 2019), it is not well-formalised or discussed. The main question that lies on the table is how we should select and treat cases for post-QCA interpretation and further study. Carsten Schneider and Ingo Rohlfing (2013; 2016; 2019) present a tool in which they work with typical and deviant cases to elaborate the work for single case or comparative studies. In general, they adapt the general plot from QCA for further analysis of diverse cases (Figure 9) (Schneider & Rohlfing, 2013, p. 585).

They distinguish six specific types of cases (see Figure 9) and set the rules for conducting a single-case study or comparative study (Schneider & Wagemann, 2012, p. 311; Schneider & Rohlfing, 2013, p. 563). However, in a newer version they distinguish just five different types when they merge individually irrelevant and irrelevant cases into one category (Schneider & Rohlfing, 2016, p. 560; 2019, p. 257). The typical cases are the cases that are members of a path set and also exhibit the outcome while being sufficient. Deviant cases for coverage are the cases where we can observe the outcome; however, the mechanism behind it is different and not covered by the path. Deviant cases for consistency are somehow characterised by the term of the solution; however, the outcome has not appeared, or the degree is not high enough to pass sufficiency. Finally, individually irrelevant cases are not covered by a solution, nor are they examples of the outcome (Schneider & Rohlfing, 2013, pp. 573–574, pp. 585–587; 2019, p. 257).[81]

[81] For further discussion, the works of Schneider and Wagemann (2012) or Schneider and Rohlfing (2013).

Figure 9 Schneider and Rohlfing - Enhanced XY plot and types of cases in fsQCA of sufficiency



(Schneider & Rohlfing, 2013, p. 585)

In general, there are four suitable comparative frames to use (see Table 15). A comparison of diverse cases helps to further specify the mechanism or to discover omitted conditions or solutions (Schneider & Wagemann, 2012, pp. 308–309; 2019, p. 257). Therefore, the correct use of different types of case should subsequently broaden and deepen the knowledge of causal mechanisms of the phenomenon under investigation. Maybe even more importantly, comparison of the cases should lead to additional improvement of the main model for the missed conditions or whole solution.

Table 15 Types of Comparisons

Comparison	Goal
Typical vs iir	Inference on mechanism
Typical vs typical	Increase confidence in general mechanism
Typical vs deviant consistency	Search for omitted conjunct
Individually irrelevant vs deviant coverage	Search for omitted conjunction

(Schneider & Rohlfing, 2019, p. 257)

Obviously, it is also possible to discuss a single-case study of the most typical cases that is ideally unique for the path (Schneider & Rohlfing, 2013, pp. 563, 573; Schneider

& Rohlfing, 2016).[82] This helps to further reveal the mechanism of causality. In case of single-case studies, Schneider and Rohlfing (2016) show how typical and deviant cases could be used for support mechanisms or uncovering omitted variables based on their previous specification of different types of case.

In conclusion, the use of post-QCA analysis is important for a continual discussion of cases and conditions. It could even lead to the revelation of omitted solutions or conditions, mainly under comparison. In this regard, we can follow the recommendation of Schneider and Rohlfing (2013; 2016; 2019). At first, we have to differentiate typical, deviant, and individual irrelevant cases. This is followed by the choice of suitable cases for a single-case studies, which will be discussed in the following chapters.[83] In the choice of the most typical case, in a situation when needed, the formula mentioned by Schneider and Rohlfing (2016, p. 552) is followed.

7.1 Mechanisms of Solutions

To answer our question, what makes climate change vulnerable countries prone to conflicts or in other words under which conditions the climate change impact could transform itself to rather higher incidents of violent conflicts, we need to take a closer look at the cases and solutions we obtained from fs/QCA. This chapter will discuss the solutions and their mechanisms for both violent inter-communal and violent civil conflicts. In some cases, the cases are sensitive to both observed conflicts and therefore will be discussed together. Although, as the focus of the thesis is on a rather high incidence of conflicts, only this part of QCA will be further discussed in post-QCA. While calculation of absence of outcome in the case of QCA is always executed, in the case of discussion it is rather lacking and the focus is on the main goal of the research (see, e.g., Ide, 2015). Due to the fact that this dissertation focuses on the question why there is a rather high incidence of conflicts, only selected cases of presence of outcome will be discussed.

[82] For an overview of the recommendations and rules see Schneider and Rohlfing (2013, p. 563).

[83] There is the whole list of rules which specify the best choice of cases for comparison and single case study (Schneider & Wagemann, 2012, p. 311; Schneider & Rohlfing, 2013, p. 563). In their latest article, Schneider and Rohlfing (2019) even propose the formula for an easier choice of cases for comparisons. However, there is no use to discuss all the rules and formulas. The rule according to which the decision was made is mentioned if needed.

In the case of violent civil conflicts, we need to keep in mind that it seems that marginalisation (low power equality) is a necessary condition for the high incidence of violent civil conflicts in countries vulnerable to climate change. However, the asymmetric power relation is not necessary to the low incidence of conflicts.

Table 16 Different cases for the solutions[84]

	CW	~CW		
Sufficient path	REG*~LAN*~EQL	~REG*LAN	~OIL*~REG*EQL	~OIL*LAN*EQL
Typical	Somalia (most typical	Chad	Lesotho (most typical),[85] Mozambique	Niger (most typical)
Deviant consistency	Burundi (in degree)	Sudan (in kind)	-	-
Deviant coverage	Sudan, Ethiopia, Uganda, Nigeria	Malawi, Kenya		
Individually Irrelevant Cases[86]	Niger, Lesotho, Chad, Malawi, Kenya, Mozambique	Uganda, Burundi, Ethiopia, Somalia, Nigeria		

(Author)

In the case of violent civil conflicts, the first case study will deal with Somalia as the most typical case for only suitable QCA solution. As for a second case for discussion, it will be the case of Nigeria that was excluded from the solution due to the low PRI consistency of the truth table row. Both cases are particularly interesting for both types of conflicts of interest, even though neither is typical for both. In case of absence of outcome, typical cases would be Chad, Lesotho, and Niger.

[84] For graphical representation of the cases in different terms, see Appendix 5–8.

[85] The value of ST_i for Lesotho is 0.05. Mozambique has 0.3. The formula for the calculation of ST_i is $STi = \frac{Y_i - X_i}{X_i}$. The closer the value is to zero, the more the case is suitable for case study and process-tracing (Schneider & Rohlfing, 2016, p. 552).

[86] This dissertation follows a later division of cases by Schneider and Rohlfing (2016; 2019) where they do not differentiate between individually irrelevant and irrelevant cases.

Table 17 Different cases for the solutions

	COM		~COM		
Sufficient path	LAN*WAT*~EQL	WAT*URB*~EQL	~WAT*~URB	~LAN*~URB	~WAT*EQL
Typical	Sudan	Nigeria, Kenya (most typical)[87]	Niger, Ethiopia (most typical)[88]	Burundi, Malawi, Ethiopia (most typical)[89]	Mozambique, Niger (most typical)[90]
Deviant consistency	-	-	Chad (in degree)	-	-
Deviant coverage	Somalia		Uganda, Lesotho		
Individually Irrelevant Cases	Ethiopia, Uganda, Chad, Niger, Lesotho, Mozambique, Malawi, Burundi		Nigeria, Kenya, Sudan, Somalia		

(Author)

In the case of inter-communal conflicts, the cases of Sudan and Kenya will be discussed as typical for the presence of outcome. In case of the absence of outcome, typical cases would be Ethiopia and Niger.

As the research involves constant communication between the cases, conditions, and theory, it is possible that, even though very brief, case studies point to different conditions that were not captured by QCA. Therefore, the following sections will discuss cases of Somalia, Nigeria, Sudan and Kenya to further develop mechanisms and logic of why these countries vulnerable to climate change become conflictual.

7.2 Ways to Violent Civil Conflicts

This chapter further discusses typical cases for violent civil conflicts. For the reasons mentioned above, the case that was excluded from the solution due to low PRI consistency was included. Another reason that leads to this decision is also the fact that Nigeria is also

[87] ST_i value of Nigeria is 0.49 while Kenya is 0.11.

[88] ST_i value of Ethiopia is 0.11 while Niger 0.15.

[89] ST_i value of Ethiopia is 0.11, Burundi 0.2 and Malawi 0.32

[90] ST_i value of Niger is 0.14 while Mozambique is 0.3

typical, although not the most typical case of violent inter-communal conflicts and, therefore, could be significant also for the discussion of this kind of conflict.

It is important to note that the purpose of the subchapters is not to develop full-scale case studies (which very often serve for whole book), but rather to check the validity and functionality of paths gathered in QCA above. Each case discussed, for Somalia and Nigeria, attempts to find the deeper reasoning behind the QCA solution and reveal the mutual influence of conditions and the ways in which they work toward the outcome.

7.2.1 Somalia: Environmental Pressure, Marginalisation and Prolonged Instability

Somalia[91] is one of the most conflictual states in Africa if not worldwide. The prolonged conflicts there are well studied (e.g., Menkhaus, 2003; 2004; Webersik, 2004; 2008; 2010; Elmi & Barise, 2006; Dehéz & Gebrewold, 2010; Pham, 2010). The influence of climate change and the environment on conflicts in Somalia is studied as relatively new (e.g., Webersik, 2010; Maystadt & Ecker, 2014; van Baalen & Mobjörk, 2018; Eklöw & Krampe, 2019), although land issues connected to the environment are very often mentioned by diverse reports or articles (e.g. Basteman & Cassanelli, 1996; Dehérez, 2009).

Conflicts in Somalia are nothing new and even though land issues together with power relations are often seen as part of the explanation since the rise of instability (Cassanelli, 1996, p. 24; Dehérez, 2009, pp. 9–14), today some authors more discuss how climate change and environmental issues which support the continuation of conflicts and prohibit the country from peaceful settlement (Eklöw & Krampe, 2019). Indeed, the root causes that sparked the collapse of the central government and the conflicts that followed since the 1980s could be summarised as "competition for resources and power, military repression, and colonial legacy" (Elmi & Barise, 2006, p. 36). Together, the problems with the appropriation of land (an important resource) and the power struggles to get it easily provoked the conflict (Cassanelli, 1996, p. 24; Webersik, 2004, pp. 516–517; Dehérez, 2009, p. 9). Clan identity later became just an instrument that helped to mobilise

[91] If not mentioned directly by Somalia, the internationally acknowledged state of Somalia is meant.

aggrieved mases on the basis of exclusion (Elmi & Barise, 2006, pp. 36–37; Webersik, 2008, p. 50; Eklöw & Krampe, 2019, pp. 7–8; Samatar, 1992).

To understand the current situation in Somalia, we must, at least briefly, mention the history of the state and the causes of conflicts in the 1980s that led to the breakdown of the regime. Somalia, although divided among various clans, is one of the most homogeneous countries in Africa in an ethnic sense. However, it is tempting to see clan division as the cause of conflicts and the fall of the regime of Siad Barre; this notion is far from the truth (Samatar, 1992).[92] As any other society, Somali also "had a traditional legal system" (Elmi, 2010, p. 32) which served as "conflict mediation" (Dehéz & Gebrewold, 2010, p. 5).[93] Indeed, Abdi Samatar (1992, p. 630) aptly notes that it "was a social contract democratically constructed (all adult males took part in this) to check the occasional conflicts between individuals and among communities." Therefore, it is rather a question of what happened when this mechanism stopped working. To answer this, it could easily be said that Barre regime occurred. Land reform introduced by Barre led to the situation where traditional owners of land lost it (Dehérez, 2009, p. 9). As Dustin Dehérez (2009) aptly notes, it was almost impossible to attain rights to land as people

> simply could not afford the expansive bureaucratic process of registering their claims with the authorities, […] Even in cases where local farmers managed to raise the money necessary to register their land, competing claims by more influential civil servants, businessmen or politicians of the Marehan, Ogaden, and Dhulbahante-clans often prevailed. (p. 9)

Furthermore, some clans have been marginalised and some favoured by the regime which was manifested in the form of access to power and resources, particularly land (Elmi & Barise, 2006, pp. 34; Dehérez 2009, p. 8). Similarly, Barre's reforms changed the character of traditional mediation that lost importance in a system that favoured some clans and marginalised others (Dehérez, 2009, pp. 8–9). These two main causes led to a situation in which some clans formed a coalition that openly challenged the regime.[94] The

[92] Barre was in power from 1969 until 1991.

[93] The system is called *heer* (Elmi, 2010: p. 31). Some authors use the form *xeer* (Webersik, 2010; Samatar, 1992)

[94] Elmi and Barise (2006) also mention colonial history or repression of the system.

civil war[95] between 1988–1993 led to the fall of Siad Barre in 1991 and also set the stage for the situation of violent civil conflicts in the current Somalia. Indeed, the form of economy was deeply connected with the traditional mediation system which no longer, in the process of modernisation, worked (Samatar, 1992). The disintegration of this system and the politics in which Siad Barre's regime mobilised support for privileged clans led to its ultimate end, as the "strategy of divide-and-rule through blood-ties in the end consumed its own strength, thereby leading to the total collapse of governmental authority" (Ibid., p. 637).

Therefore, the combination of land issues, marginalisation and instrumentalization of clan identity formed the basis for the conflicts in Somalia right from the very beginning and were important conditions that led to the current situation. Due to the fact that land was the main source of livelihood, this led to conflict (Dehérez, 2009, pp. 9–14). The conflict did not end with the fall of the regime and the problems survived in the following years as well (Webersik, 2008, p. 50).[96] Obviously, with the ongoing conflict in Somalia, this troublesome situation is still real. According to QCA the explanatory term for which Somalia is a typical case is a combination of regime instability, rather poor access to land, and marginalisation.

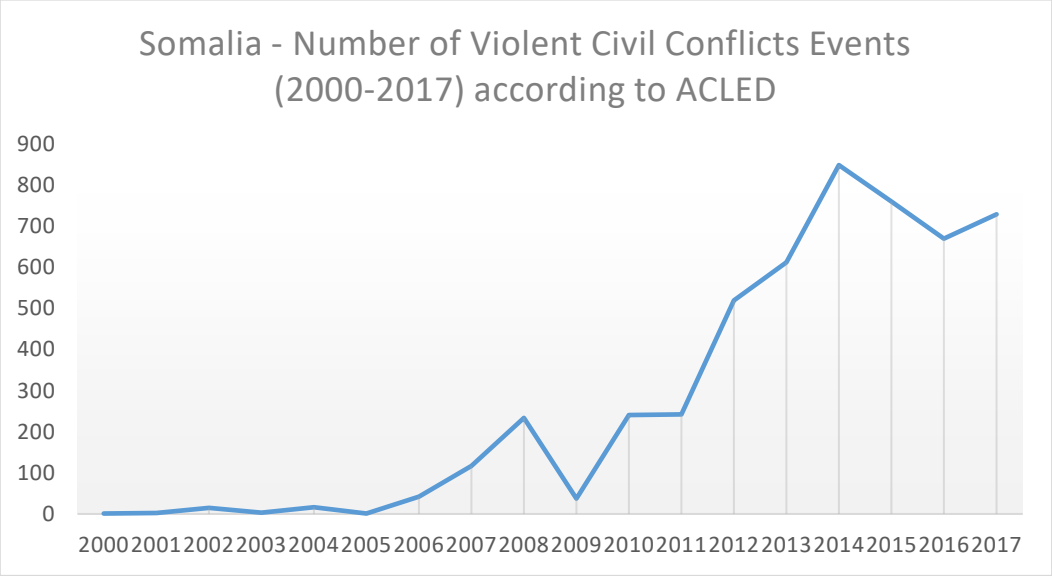
To properly discuss this case, it is also important to return to the roots of its climate change vulnerability. Somalia had a historically great experience with climate change-induced environmental changes (Webersik, 2008, pp. 49–50). This could be observable even in language, as Somalians have the words both for floods and droughts that influence their way of living (Webersik, 2010, p. 37). If we evaluate Somalia in the case of vulnerability, it falls into the category of climate change-political and economic vulnerability (see Table 2). The reasons are obvious because Somalia has, due to prolonged conflict, an ineffective (or even non-functional) central government and is a very poor country. Ken Menkhaus (2004, pp. 149–153) even refers to Somalia as an example of a "vicious circle" where poverty, instability, criminality, and ineffective

[95] In this case particularly, the term civil war is used as most of authors would agree on the label for the situation in Somalia.

[96] Abdi Samatar (1992, p. 631) goes much further and connects civil war and the fall of governance in Somalia, apart from the destruction of the traditional mediation system, also to "the commercialisation of […] livestock" and "the imposition of a colonial state".

government mutually reinforce each other. The absence of law and an effective central government obviously makes Somalia very vulnerable to climate extremes.

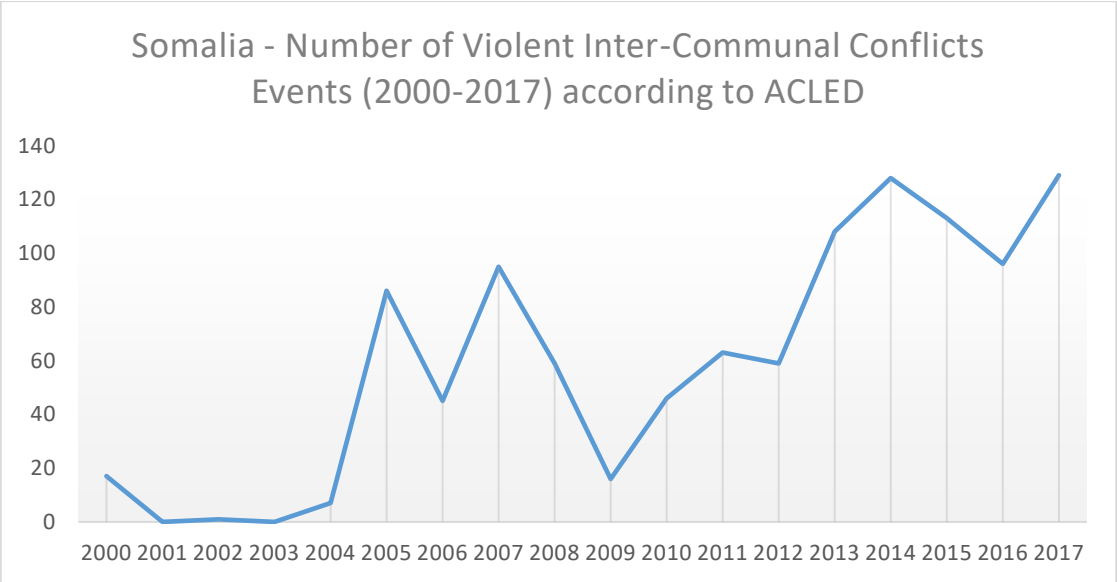
Figure 10 Somalia - Number of Violent Civil Conflicts Events (2000-2017)



(Source of Data: ACLED, 2020; Raleigh et al., 2010)

Unfortunately, the situation is even more desperate with the widespread poverty. During the studied period, numerous people were affected by droughts or floods. Mainly in 2010 and 2015, the population suffered from climatic influence (see Figure 12). When we compare this with the rise of the violent civil conflicts, we can see that the number of violent civil conflicts rises in similar years as the number of climatically affected people. The rise in conflict events follows the waves of droughts and floods. An easy link and shortcut could be made to say that there is a connection between harsh weather and conflicts. However, we should not put too strong an emphasis on this, as the most important thing for this analysis is the result of QCA.

Figure 11 Somalia - Number of Violent Inter-Communal Conflicts Events (2000-2017)

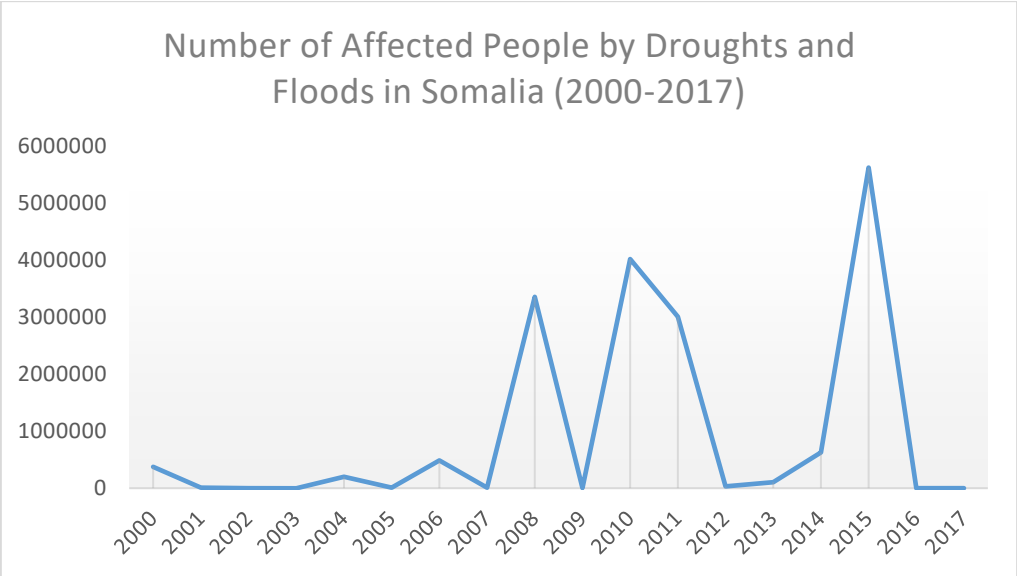


(Source of Data: ACLED, 2020; Raleigh et al., 2010)

Events like droughts and floods have a large impact on the livelihoods of people. This could indirectly nurture the conflicts in Somalia. Indeed, Jean-François Maystadt and Olivier Ecker (2014) support this argument in the case of husbandry through which droughts cause conflicts. The logic of this argument is clear, as the Somalian population is dependent on agriculture and livestock. When unpredicted extreme weather appears, this puts enormous stress on it (Eklöw & Krampe, 2019, p. 15).

This leads us to the solution derived through QCA. Without the government that would support society, and in the situation of protracted conflicts which prohibit sustaining livelihood, this leads to both greed (elites) and grievances (masses). Protracted instability (absence of a stable regime), together with land issues and mainly marginalisation, is fatal for livelihoods, particularly drought or flood, in situations such as climate change. The role of marginalisation that according to QCA is the necessary condition causing the conflicts in the case of countries vulnerable to climate change is also supported by Christian Webersik (2004, pp. 217–524; 2008, p. 50) or Karolina Eklöw and Florian Krampe (2019, p. 22). When we connect this to the other two conditions, the population becomes very prone to conflicts.

Figure 12 Number of Affected People by Droughts and Floods in Somalia (2000-2017)[97]



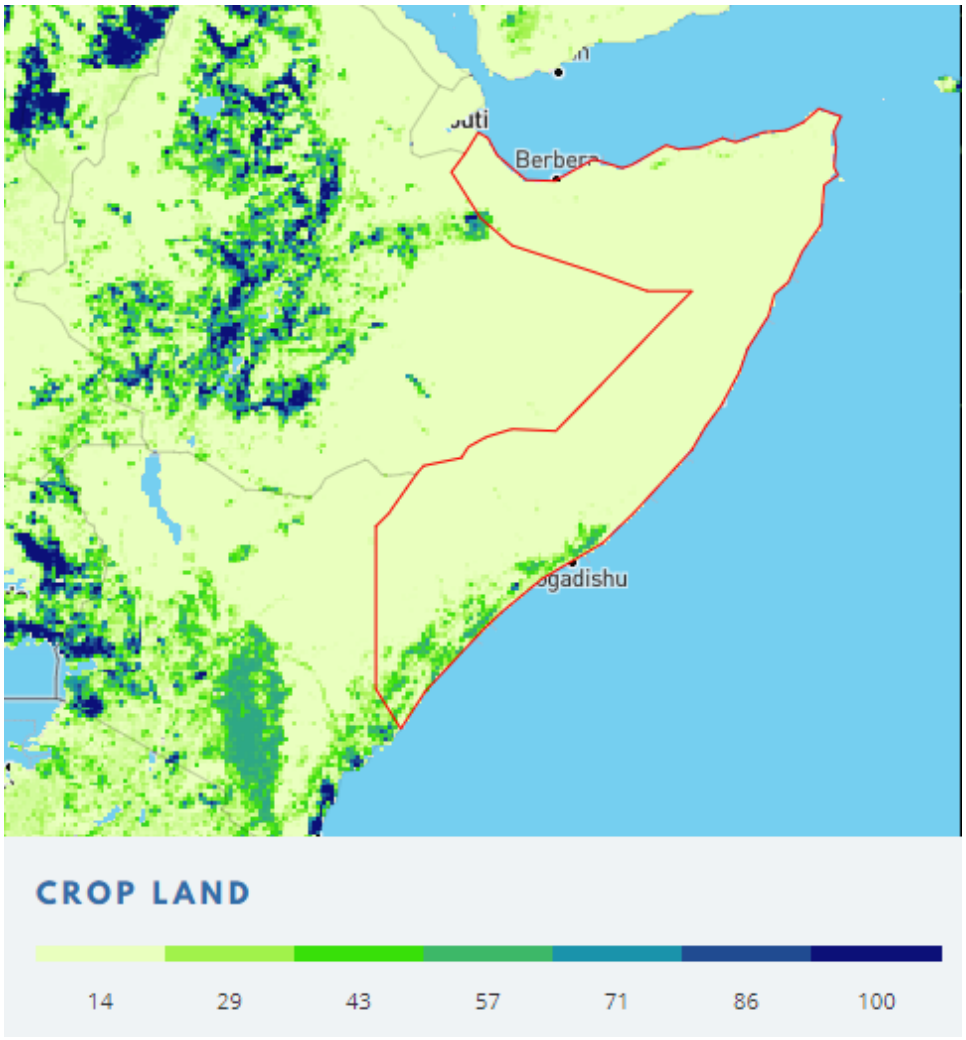
(Source of data: EM-DAT 2020)

As mentioned above, land is a highly disputed resource in Somalia. A brief look at a map (see Figure 13) of croplands in Somalia gives us a clear notion that land is scarce goods. This was also identified by communities in Somalia who according to the report of the Somalia National Adaptation Programme of Action to Climate Change, mentioned problems with access to crop land and pastureland due to droughts or floods (Federal Republic of Somalia, 2013, p. 36). Similar impacts are also described in the report *No Land, No Water, No Pasture,* where Somalis express the impact of droughts on their livelihoods (Ferrández, 2020).[98] The problem with droughts or floods is that they destroy the already scarce land and the means of life attached to it. Land is an important means of living. For example, in an interview with the United Nations (2017), an interviewee depicts how a drought led to the death of cattle and crops, "We had cattle, goats, and fertile farmland. We did not receive sufficient rains in the last three years. Our livestock died and crops dried up. We fled from hunger and thirst."

[97] No affected people in the figure does not necessarily mean that there were no drought or floods.

[98] Even though interviews were gathered during 2019 (Ferrández, 2020, p. 5), the information has informative value for our discussion. The reason is that droughts and floods impact societies for a long time after they end.

Figure 13 Crop Lands in Somalia according to Climate Change Knowledge Portal



(Source: World Bank Group, 2020b)

The problem with the land is also connected to long-lasting conflicts, as both force many Somalis to leave. Because of the regime instability, this leads to a situation when many Somalis head to IDP camps or urban areas where they are easy target of for rebel groups such as al-Shabaab (Eklöw & Krampe, 2019, p. 21). This is also the case of the interviewee in the report *Journey to Extremism* by UNDP where the former al-Shabaab member refers to a drought which led to the situation when "nearly all the livestock perished" that led him to Mogadishu where his uncle recruited him (UNDP, 2017). In this sense, the state is an easy target for greedy leaders of rebel groups or terrorist groups like al-Shabaab. People deprived by the difficult situation because of the protracted conflicts, land scarcity, and climate change impacts are than mobilised by elites who focus on the war economy (Webersik, 2010, pp. 37–38) or terrorist groups (Eklöw & Krampe, 2019,

p. 23). According to interviews gathered in the article by Anneli Botha and Mahdi Abdile (2014, pp. 6, 8, 12), it is an economic factor and vision of a job that very often brought interviewees to al-Shabaab. Similarly, an interviewee from the *Journey to Extremism* report mentions "economic needs" (UNDP, 2017a). This is easily related to famine and poverty due to droughts. Amnesty International repeatedly warns about the vulnerability of young Somalis to recruitment by al-Shabaab that is caused by poverty (Wooldridge, 2011; 2011a).

Al-Shabaab, with the whole name *Harakaat Al-Shabaab Al-Mujaahiduun*,[99] is probably the most important insurgent group in Somalia in the period of this dissertation. Interestingly, although this group is Islamist in its core Islam, sharia is rather unimportant in among Somalis, as Ken Menkhaus (2002) aptly referred to it as a "veil lightly worn". However, al-Shabaab is capable of an instrumental usage of clan identity and marginalisation. While on the one hand it goes clearly against clans, it also uses those who are or feel that they are on the political or economic periphery (Ingiriis, 2018, pp. 234–235; Anderson & McKnight, 2015, p. 543). Al-Shabaab is ultimately able to promote both "cross-clan coalitions" but also abuse political inequality (Ingiriis, 2018, p. 235). As aptly noted by Ingiriis (2018):

> Al-Shabaab leaders have both formal and informal links with the peripheral clans and communities in which they operate in their territories. Whereas the formal links are about maintaining relationships with clansmen, the informal interactions are about exploiting the sense that peripheral clans feel excluded and marginalized. (p. 235)

Therefore, marginalisation here plays a significant role both on the individual and in the group level, too. In case of Somalian society, which is divided among clans and sub-clans, the clan marginalised from power-sharing is obviously not happy about the situation, as the power gives, in general, the possibility of patronage (Elmi & Barise, 2006, p. 37; Webersik, 2004, pp. 523–524; Webersik, 2008, p. 50; Anderson & McKnight, 2015, p. 543). The political exclusion of specific groups and clans was,

[99] Peter Chonka (2016) uses more the abbreviation HSM as al-Shabaab is not used by members of the group. However, for the sake of the readers, this thesis uses the more commonly used al-Shabaab.

according to some authors, one of the causes already at the beginning of the conflicts in Somalia (Elmi & Barise, 2006, p. 33; Webersik, 2004, p. 517; Eklöw & Krampe, 2019, p. 6). Such a marginalisation could lead to a struggle with the central government and also between communities. Aggrieved and deprived individuals or groups are later easily recruited by al-Shabaab or other militant groups (Eklöw & Krampe, 2019, pp. 22–23; Ingiriis, 2020, p. 365). In this sense, they effectively use clan rivalry and political marginalisation (Ingiriis, 2020, pp. 368–371; Anderson & McKnight, 2015, p. 543). This is aptly noted by Mohamed Ingiriis (2020, p. 372), who argues that the main factors are "political marginalisation and religious indoctrination."[100] This further supports the argument about marginalisation as the necessary condition for the high incidence of conflicts in countries vulnerable to climate change.

Marginalisation thus plays a significant role for mobilisation. Clan identity is rather an instrument through which grievances are expressed and further "exacerbated" (Ibid., p. 372). Marginalisation, according to the analysis, is a necessary condition, intertwined in mutual interplay with land deprivation and protracted regime instability, which turn climate change vulnerability into violent civil conflict. In the situation of climate change impact, those conditions mutually strengthen each other. Climate change has put another stress on already scarce land. Dysfunctional administration and protracted violence make the situation even worse. This is further accentuated by regime instability, which impedes any reasonable adaptation or mitigation of the climate change impact. After all, issues like the marginalisation, both economic and political, of people and whole groups (clans) make the population easy targets for rebel groups who benefit from the war economy or for terrorist groups like al-Shabaab who promise ordinary people a way out of the economic exclusion.

The same explanation could generally also work for inter-communal violence. Somalia is a deviant case for coverage in case of high incidence of inter-communal conflicts. In the case of inter-communal violence, it is a member of the truth table row ~WAT*~LAN*URB~EQL, together with Uganda, which has a rather low incidence of inter-communal conflicts. Therefore, we should ask what makes the outcome of these cases different. It could be said that it is the stability of the regime. Somalia obviously

[100] Ingiriis (2020, p. 365) further mentions "personal gains or better economic prospects."

has a very unstable regime; however, the Ugandan regime under Yoveri Museveni is rather stable. Therefore, a similar explanation for violent civil conflicts could work (land scarcity, instability, and marginalization). We cannot forget that violent inter-communal and violent civil conflicts are interwoven. The instability of the regime influenced by civil conflicts influences inter-communal conflicts. To what has already been mentioned, we can add high urbanisation rates and relative water scarcity. People migrate to cities in an effort to find a new way of living due to the fact that their previous livelihood was destroyed by other conflicts or climate and environmental changes. According to Eklöw and Krampe (2019, pp. 28–29), urbanisation plays an important role in recruitment and radicalisation in Somalia. The problem is that the ineffective Somali government is not prepared for the urbanisation, which leads to deprivation again.

To conclude, the current situation of climate change and its influence on conflicts in Somalia could perfectly be depicted by Eklöw and Krampe (2019, p. 23): "The amount of cultivable land that is safely available to civilians is decreasing due to environmental change, land degradation and conflict. The resulting displacement and marginalization contribute to grievances and violence […]." Therefore, violence makes the regime unstable and enforces the climatic impact. Marginalisation then plays an important role in mobilisation. This proves true both in the case of inter-communal and civil conflicts. Partially, in the case of inter-communal conflicts, it is also urbanisation which is a result of the loss of livelihood due to climate change.

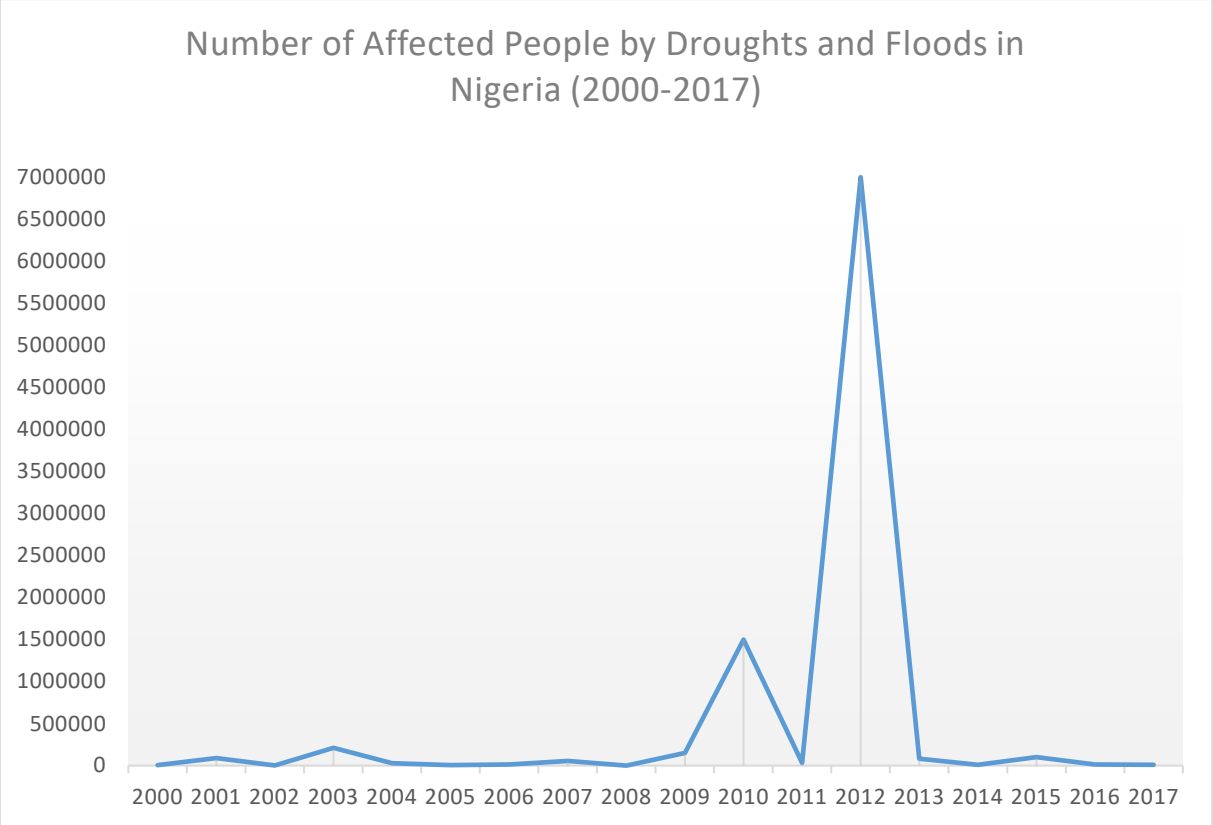
7.2.2 Nigeria: Climate Change and the Environment around Lake Chad

Nigeria, as already mentioned, is a problematic case due to the fact that it is part of the truth table row with a low PRI consistency and therefore it was excluded from minimisation. However, it is included here, firstly, it is very often discussed as influenced by climate change (cf. Ubhenin, 2012; Onuoha, 2010; Ayodele, 2010; Rizzo, 2015), which makes it an interesting deviant coverage case. Second, it is a typical case, even though not most typical, for the inter-communal conflicts solution path which combines rather high urbanisation rates, access to water and marginalisation (WAT*URB*~EQL). However, the main reason is the first one. The fact that it was excluded from minimisation, while for good reasons, it raises the interest in the case to explain it. Inclusion of the "Nigerian" row would also lead to a new solution, although problematic.[101] The solution after minimisation would combine a rather high dependence on oil, a lack of arable land, and marginalisation (OIL*~LAN*~EQL). This is a good clue to uncover the conjunction under which climate change vulnerability turns into violent civil conflicts in Nigeria.

Like Somalia, we should start with the vulnerability to climate change of Nigeria. It falls under climate-change density vulnerability – the most "Malthusian" branch of the climate-change vulnerability. The density of the Nigerian population is swiftly growing starting at a level of 134 people per square km in 2000 and reaching 210 people per square km in 2017 (World Bank, 2020k). The average annual population growth between 2000 and 2017 was 2.6% (World Bank, 2020a). This makes Nigeria very vulnerable through the ratio of resources for possible redistribution and population. For example, the amount of arable land is shrinking over a long-term perspective (from 0.29 hectares per person in 2000 to 0.18 hectares per person in 2016). With extreme climatic events such as droughts and floods, the Nigerian economy and livelihood of ordinary people are often significantly affected (World Bank Group, 2020c). From the graph (see Figure 14), we can realise that Nigeria is often hit by droughts or floods. Mainly in 2012, the floods contributed to a significant loss in production (World Bank Group, 2020c).

[101] It would be a solution without a typical case. This points even more to a correct exclusion of the row.

Figure 14 Number of People Affected by Droughts and Floods in Nigeria (2000-2017)



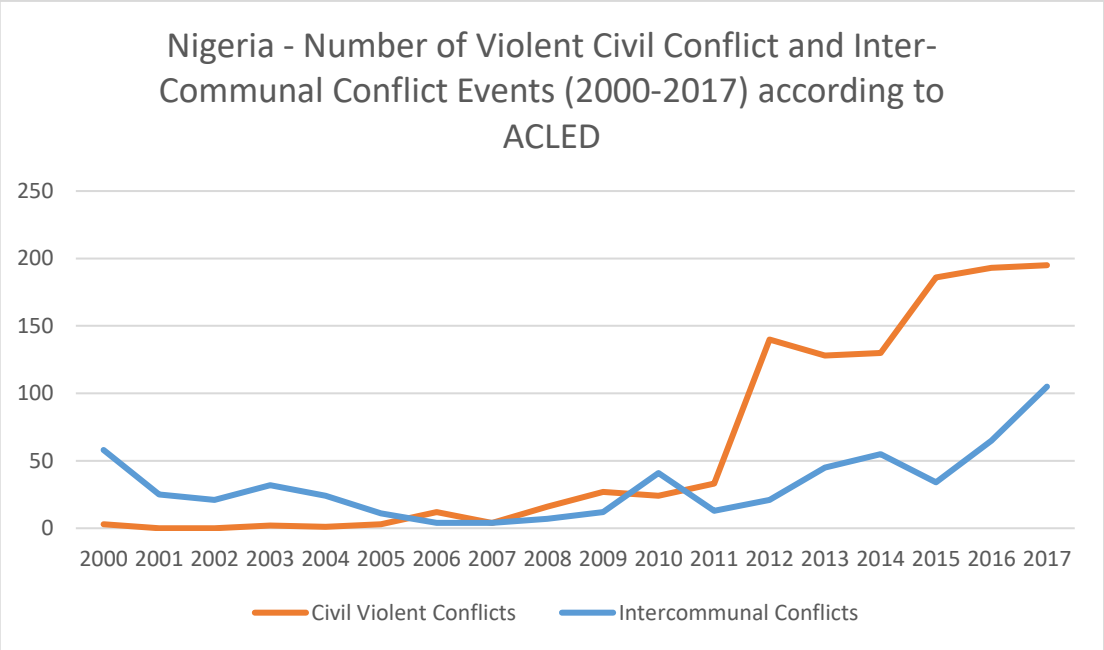
(Source of data: EM-DAT 2020)

In case of violent civil conflicts, we can observe an increase in incidence after 2012. It could be tempting to connect it to the impact of weather extremes in 2012. However, this would be an overinterpretation and oversimplification. This rise in events relates to the activity of Boko Haram. Therefore, it is important to check the social and political conditions that stand behind the Boko Haram insurgency.[102] However, dependence on oil and land scarcity and marginalisation could easily also be applied in the case of the Niger Delta and Movement for the Emancipation of the Niger Delta (MEND) rebellion that is responsible for the majority of violent civil conflict events in the early period of the time span of data used in this dissertation. Oil extraction here functions as the main cause of conflict, connected with pollution and the further degradation of land and marginalisation (Courson, 2011, pp. 22–25). The situation in the Niger Delta is a clear example of an oil curse. Indeed, the economy of Nigeria is heavily dependent on oil production and other

[102] Recently, we can speak of other groups, splitters and factions like ISWAP, Islamic state West Africa Province.

sectors, particularly agriculture, are not the main interest of the government (Bagaji, Achegbulu et al., 2011, p. 37; Courson, 2011, pp. 25–26). In this regard, it is even worse, as pollution from oil destroys the livelihood (agriculture and fishing) of local people (Bagaji, Achegbulu et al., 2011, p. 37). This is also connected with unequal investments when even though most of the Nigerian oil is in the Niger Delta, the regions receives a lower amount of revenues for this region (Okpanachi & Andrews, 2012, p. 439; Ebienfa, 2011, p. 637). This leads to grievance, but also to greed (Courson, 2011, p. 29). Therefore, the solution could also apply to the Niger Delta.

Figure 15 Nigeria - Number of Violent Civil Conflicts and Inter-Communal Conflicts Events



(Source of Data: ACLED, 2020; Raleigh et al., 2010)

Although environmental change (degradation) plays a significant role, it is much harder to connect conflicts in the Niger Delta directly to climate change vulnerability. The oil industry influences the climate through indirect influence. As it contributes to global warming or acid rains (Ayodele, 2010, pp. 107, 115). However, the more direct mechanism is the one where oil directly destroys the environment through the pollution of water and land degradation, which destroys the livelihoods of local people. This is more visible and tangible for the local population. It is more of an environmental change than climate change or climatically induced environmental change in the case of the Niger Delta. However, in summary the Niger Delta insurgency is connected with the marginalisation of the region and corruption connected with the oil industry in the region

that is also connected to the destruction of land in the area. So clearly the insurgency in the Niger Delta perfectly fits in the QCA results and it is clearly visible that marginalisation, destruction of environment and corruption makes climate-change or rather environmental change vulnerability in this area conflictual.

Similarly, it could be claimed that the QCA solution fits on the Igbo and Biafra problem that is also connected to marginalisation and inequality. According to Arnim Langer and Satoru Mikami (2013, p. 231) Igbos are "the most frustrated" group in Nigeria. Using data from Afrobarometer, they show that Igbo respondents feel much more marginalised and dissatisfied with their political position (Ibid., pp. 241–242).[103] Although with continual marginalisation, the climate and environmental changes could also influence this conflict, this is more a question of the future. Therefore, it could be suggested that this conflict has rather little to tell us what transforms a country vulnerable to climate change to conflictual.

Rather, the Boko Haram,[104] Islamic State West Africa Province (ISWAP) insurgency and the situation in Borno and the area around Lake Chad seem to be very important from the point of view of violent civil conflicts and climate change vulnerability and how this vulnerability evolves into violent conflict. Boko Haram is well known for its violent insurgency in North-Eastern Nigeria which is well-documented by journalists and scholars. Sometimes Boko Haram is understood through the lenses of a North versus South division of Nigeria, however, this would be over-simplifying (Akinola, 2015, p. 10). This is even the topic of political struggle and misinformation in which Boko Haram is said to be supported by northern or southern elites, depending on who uses the misinformation (Higazi, 2015, pp. 327–328; Thurston, 2015, p. 128;

[103] This is still visible in the latest rounds of Afrobarometer (R7) where 89.3% of Igbo respondents answered that their ethnic group is sometimes, often or always treated unfairly. A higher percentage is just in case of Ijaw, Gwari, Isoko, Itsekiri, or Jukun. However, in the case of these groups, there were a maximum of 28 respondents (mostly it is less than ten respondents) from the groups. Therefore, its representativeness is questionable when compared with 270 Igbo people. The question was: "How often are [R's Ethnic Group] treated unfairly by the government?" (Afrobarometer Data, 2020).

[104] The whole name of the group is *Jamaʾat ahl al-sunna liʾl daʾwa waʾl jihad*. For the sake of accessibility by readers the name Boko Haram is used even though it is a name rather given by Nigerians (Higazi, 2015, pp. 312–313).

Walker, 2012, p. 7). The roots of Boko Haram could be found in the early 2000s. [105] The group is built on a radical form of Salafism[106] and builds on "religious exclusivism" and "a politics of victimhood […] that its violence responds to what it sees as a decades-long history of persecution against Muslims in Nigeria" (Thurston, 2016, p. 5). Its founder Mohammed Yusuf built on the heavy criticism of central government that he saw as corrupted (not just in an economic point of view), anti-Muslimism and against sharia and Islam in general (Thurston, 2016, p. 15–18; Walker, 2012, p. 8). To this, Andrew Walker (2012, p. 13) aptly describes the political and social environment in Nigeria in the times of Boko Haram emergence as very problematic from the point of view of wide-spread corruption, a bad economy or police brutality. Throughout its history, it committed several assassinations, bombing and overall fights against the central government of Nigeria; the turning point for level up of violence came in 2009 after a clash with local police over motorcycle helmets law (Walker, 2012, pp. 3–4; ICG, 2014, pp. 10–13). While Mohammed Yusuf was killed in custody in 2009, this did not destroy the group as the leadership was taken over by Abubakar Shekau.[107] From then on, the group clearly increased the level of violence and its power (ICG, 2014, pp. 14–18). However, the group was not spared from factionalism and currently we can find diverse groups more or less connected to it or a rival to it.

To fully understand Boko Haram, its sustainability and recruitment, we have to focus on local conditions in northern Nigeria. According to some authors (Rizzo, 2015; Onuoha, 2010), environmental conditions are particularly important. People under the stress of climate and environmental change are an easy target in situations of hardship to find a proper livelihood, while they are also politically marginalised. Lake Chad provides an important source of living; however, its area has been significantly reduced since the 1960s (Ross, 2018). According to some authors the lake has stopped the shrinking in recent years, however, the future is uncertain (Pham-Duc, Sylvestre, Papa et al., 2020;

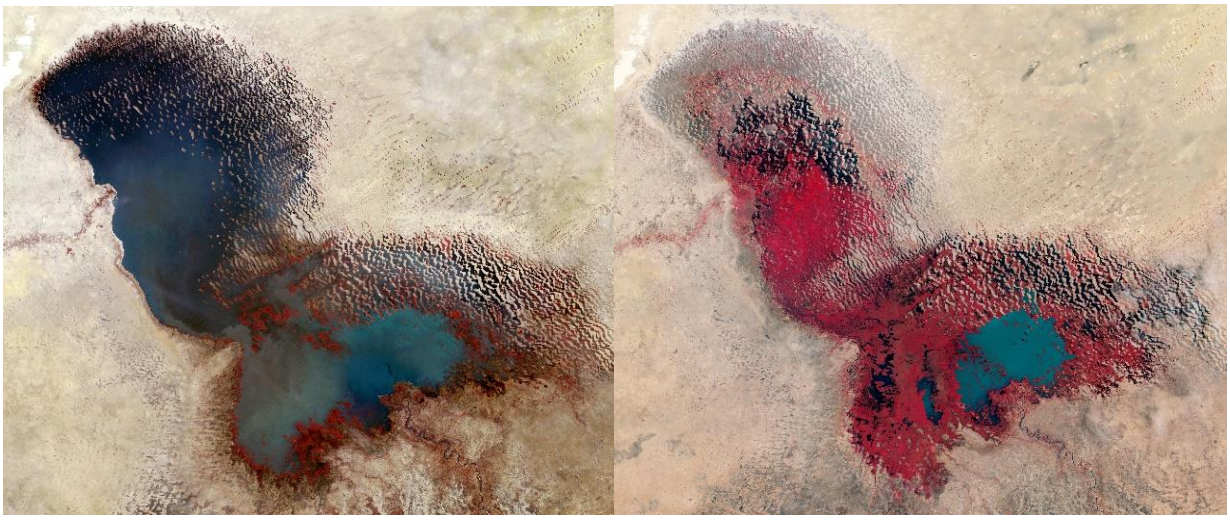
[105] A deeper history of Boko Haram is not the main aim of the chapter. However, for the history of Boko Haram and further analysis see works by e.g. Agbiboa (2013, 2013a), Higazi (2013, 2015), Thurston (2016, 2017) or a report by ICG (2014).

[106] I purposely mention the radical form of Salafism due to the fact that as Alex Thurston (2015) highlights, the group attacks also more "mainstream Salafis".

[107] According to some reports, Yusuf was less violent in the beginning than Shekau, who was among those who wanted the movement to be more radical from the start (ICG, 2014, p. 9–10).

Hansen, 2017). When we compare the area of Lake Chad in the 1970s and today, we can see a significant change (see Figure 16). This was mainly caused by droughts during the 1970s and reduced rainfall in the 1960s (NASA Earth Observatory, 2020b; Hansen, 2017; Usigbe, 2019). Today, Lake Chad is in the view of scientists and journalists who warn against environmental crises, which are connected with poverty, internally displaced people, and conflicts (cf. Onuoha, 2010; Rizzo, 2015; Usigbe, 2019; Salkida, 2012; Ross, 2018). It is true that the Lake Chad basin is heavily impacted by changes in precipitation and droughts (Hansen, 2017). In this regard, this is very important because the local population is inevitably dependent on the resources provided by the lake (Usigbe, 2019). Obviously, the agriculture and fishing that are heavily impacted, and which are the main sources of livelihood, are endangered (Rizzo, 2015, p. 16; Onuoha, 2010, p. 33). This destruction of livelihoods leads to underdevelopment that threatens the whole population. With the growing population around the lake and decreasing resources (land scarcity due to desertification, climate change, and water pollution), this puts a significant stress on the population (Onuoha, 2010, p. 28; Ross, 2018; Mercy Corps, 2016, pp. 5–6).

Figure 16 Lake Chad 1973 and 2017



(Sources: NASA Earth Observatory, 2020; NASA Earth Observatory, 2020a)

Therefore, climate change vulnerability makes local people very sensitive to Boko Haram recruitment. In the case of Nigeria, it is very often argued that especially young people are the ones that are the most deprived (Ubhenin, 2012, pp. 538–539). Boko Haram then exploit this with promises of easy money, loans, and better livelihood as reported by former members or supporters of Boko Haram (Fessy, 2016; Babatunde,

2018, pp. 385–386; Higazi, 2015, p. 340; Abrak, 2016; Maza, Koldas & Aksit, 2020, p. 6; Mercy Corps, 2016, p. 13). In this regard, it is popular opinion in Borno that it is unemployment and underdevelopment or poverty that make people easy targets for recruitment (Onuoha, 2014, p. 6).[108] Indeed, Boko Haram easily takes advantage of economic insecurity (Agbiboa, 2013, p. 151; Rizzo, 2015, p. 19; Nagarajan et al., 2018, p. 25; Akinola, 2015, p. 13). In the Mercy Corps report (2016, p. 13) based on interviews, the promise or "the lure of business support" is very important.[109] Therefore, the land deprivation associated with desertification and the overall lower aridity of the soil due to the shrinkage of the Lake Chad leads to underdevelopment around the area and uncertain futures. Boko Haram could use this to promise support and a better future and recruit people on these bases. Obviously, this does not mean that Boko Haram does not use forced recruitment (Maza, Koldas & Aksit, 2020, p. 6).[110] Also, this economic insecurity should not be over-estimated as the sole factor (Thurston, 2016, p. 7).

The big question is how to interpret the presence of oil and how it influences the Boko Haram insurgency in the North. While oil is mainly located in the South and is often connected with conflict in the Niger Delta. Although the presence of oil could just be a coincidence, it could point to another structural problem in Nigeria. Oil dependence, as one of the conditions on the solution path, could be related to the problem of subsequent corruption of government. According to Higazi et al. (2018, p. 205), corruption is one of the main aspects behind the rise of Boko Haram. Although some authors argue that the oil around Lake Chad is also part of the explanation due to the opportunism of Boko Haram and interconnection with inter-state disputes (particularly between Chad and Nigeria) (Omenma, 2020), a focus on the role of the oil in the whole political economy of Nigeria seems plausible. Oil is often linked to corruption, poverty, and state failure (cf. Ross, 2001, 2015; Okpanachi & Andrews, 2012). This is also the case for Nigeria. As a country, it is dependent on oil (average oil rents are 12.1% of GDP in period 2000–2017) (World Bank, 2020b). The fact is that oil production in Nigeria is argued to be heavily

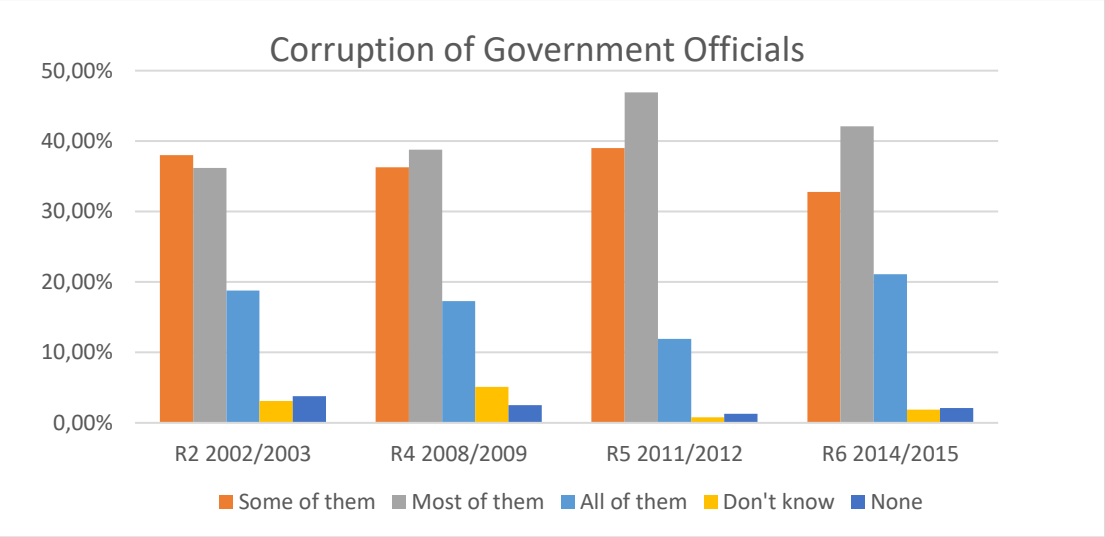
[108] This perception is also supported around the whole Nigeria (Ewi & Salifu, 2017).

[109] However, poverty per se as a cause, according to Mercy Corps (2016, p. 13), is seen rather as a "myth"

[110] Caitriona Dowd and Adam Drury (2017, p. 145) report increased forced recruitment as time goes by. Mercy Corps (2016, pp. 11–12) report most of the youth somewhere between both extreme ends of the spectrum of voluntary and forced recruitment.

connected to corruption (Okpanachi & Andrews 2012, pp. 434 – 435; Courson, 2011, pp. 27–28). According to the Corruption Perception Index by Transparency International Nigeria, shows high levels of corruption, as in the long-term it receives just approximately 26 points out of 100 (Transparency International, 2020).[111] The popular perception of the corrupt government in Nigeria is very convincing. From the Afrobarometer survey (2020a; 2020b) it is clearly visible that Nigerians see government and presidential office as very corrupt (see Figures 17 and 18). According to the Mercy Corps report (2016, p. 14) "frustration with government corruption" is often presented in Borno and by former members and supporters of Boko Haram.

Figure 17 Corruption of Government Officials[112]



(Source of data: Afrobarometer Data, 2020a)

Boko Haram builds on this deeply rooted dissatisfaction (Nagarajan et al. 2018, p. 13). As Daniel Agbiboa (2013, p. 147) aptly notes, "[l]ike the members of the Maitatsine movement, many of the members attracted by Boko Haram are animated by deep-seated socioeconomic and political grievances". William Hansen and Umma Aliyu Musa (2013, p. 287) argue that Boko Haram in this sense uses the grievance of discontent of northern Nigerians with a corrupt state. In this regard, poor institutional performance becomes problematic, and it could relate to environmental problems around Lake Chad (Rizzo,

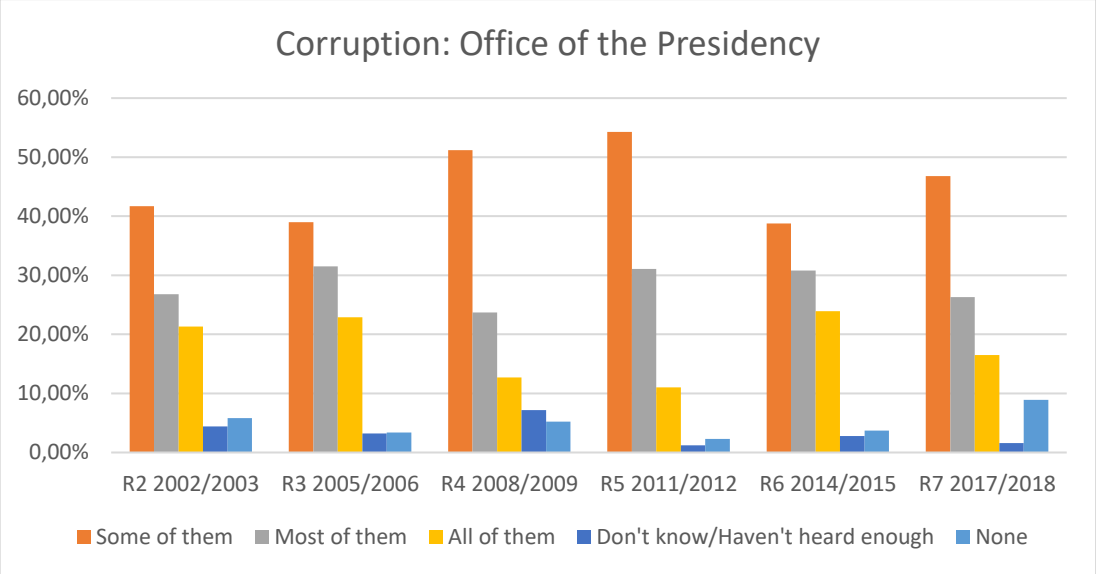
[111] Transparency International ranks countries on a scale of 0 (high corruption) to 100 (low corruption) (Transparency International, 2020a)

[112] The question was: "How many of the following people do you think are involved in corruption, or haven't you heard enough about them to say: Government Officials?" (Afrobarometer, 2020a).

2013, p. 20). As highlighted above, dissatisfaction with government is strong among those who support Boko Haram. Boko Haram can easily turn the corruption perception and discontent – mainly among younger population – into grievances and recruitment. This is a dangerous cocktail. Especially when we know that the area around Lake Chad is also marginalised, neglected and forgotten by the same government (Nagarajan et al., 2018, pp. 11–12; Babatunde, 2018, p. 385). Marginalisation is, in this regard, significant as it connects the whole path together as a necessary condition. The narrative of corrupt government, marginalisation and land scarcity makes people easy to recruit on the basis of exclusion and underdevelopment while offering them a "livelihood." These deeply rooted and present feelings of negligence and the grievances around Lake Chad towards an oil-dependent corrupt government which neglects the region (Mercy Corps, 2016a, 5–6) are therefore there to mobilize and attract local people to join the Boko Haram ranks or to gain support. When people feel marginalized politically and economically, this makes it easy to recruit them. This could be further supported by a common identity as Caitriona Dowd (2015, p. 519) states: "[…] where discrimination is experienced as religiously determined, that identity in turn provides the basis for collective mobilization." Boko Haram fills the gap left by the corrupt government. It offers services and a future to the forgotten and marginalised that the state is not able to provide (Maza, Koldas & Aksit, 2020, p. 8). Even though Boko Haram is "unpopular in most areas" where it operates (Higazi, 2015, p. 339) the provision of the services and economic incentives could outweigh it. Afterwards, Boko Haram wraps these grievances about marginalisation in a collective (religious) identity to mobilize people (Dowd & Drury, 2017, p. 142).[113] On the other hand, we have to remind that there are forced fighters who are coerced to fight.

[113] It is important to mention that Boko Haram is perceived as "anti-Islam" (Higazi, 2015, p. 322).

Figure 18 Corruption: Office of the Presidency[114]



(Source of data, Afrobarometer Data, 2020b)

Therefore, oil dependency in the case of Nigeria could be interpreted as an institutional problem with a corrupt government that does not care, while this fact is used as an argument for why to fight against the government. As mentioned above, this argument was also present at the beginnings of Boko Haram. Together with environmental degradation (land scarcity) and marginalisation, this makes for a dangerous mix. As Daniel Agbiboa (2013, p. 148) concludes: "[…] the cocktail of political corruption, chronic poverty, and youth unemployment in northern Nigeria continues to fuel members and supporters of Boko Haram." Therefore, we can understand it on several levels. Climate change led to poverty, and further underdevelopment, and uncertainty that the state was unable to mitigate due to corruption and other conditions. With land degradation, discontent about the corrupt government, and the marginalisation of the local population, this provides fertile ground for Boko Haram activity. Therefore, it is "structural and multi-dimensional factors" that helped Boko Haram rise (Higazi et al., 2018, p. 205). All these conditions create a dangerous self-sustaining spiral, in which a climate-change vulnerable country becomes conflictual due to oil-corruption, marginalisation and land issues around Lake Chad.

[114] The question was: "How many of the following people do you think are involved in corruption, or haven't you heard enough about them to say: The President and Officials in his Office?" (Afrobarometer Data, 2020b).

The vulnerability to climate change obviously also set the stage for inter-communal conflicts in Nigeria. However, for inter-communal violence, the path that turns vulnerability into conflicts, combines relatively good access to water, high rates of urbanisation and marginalisation (WAT*URB*~EQL). Although high rates of urbanisation and marginalisation make theoretical and empirical sense in case of water abundance, it is surprising. As Onuoha (2010) argues:

> Urbanisation would exacerbate the level of deprivation, which in turn, would worsen the level of social grievances. As deprived individuals and social groups engage in fierce competition for dwindling natural (freshwater) resources in the lake region and further afield in the north-east zone, future access will increasingly reflect the strength of claims from different users and actors […] When existing political institutions and structures are incapable of resolving these competing claims, the tendency for violent intergroup conflicts over access to shared resources becomes more likely. (p. 33)

Urban areas in this respect become places for disputes for resources and young people in urban areas become prone to criminality. Due to climate change and subsequent movement to new areas or cities, some parts of the population become marginalised in their access to resources. Hence, we could turn the question on access to water towards rights to access water sources. This could lead to disputes and violent conflicts among various groups for privileges. Therefore, even if there could be a relatively good amount of water in combination with marginalisation, the rights to it could be limited. Often studied is the case of Jos. Jana Krause (2017, pp. 269–270) argues that in the case of inter-communal violence around Jos it is the case of access to government and political and other rights. Indeed, growing urbanisation gives rise to the question of indigeneity and rights connected to it, as different groups define it differently (Madueke, 2018, p. 92).[115] This supports the argument about marginalisation as an important feature. If groups in urban areas feel marginalised or worried that they will be marginalised, thus losing dominance and rights, that could result in violence. This could obviously be even more

[115] There are regulations that favour indigenes in diverse ways (see Krause, 2011, p. 25)

dangerous, as this could be instrumentally used by elites to mobilise the masses on the basis of ethnicity or religion (Krause, 2017; Madueke, 2018, p. 94).

On the other hand, the abundance of water does not make sense, especially in terms of understanding the inter-communal conflicts around Lake Chad or farmer-herder conflicts. Herders also suffer from the negative impacts of climate change (Mercy Corps, 2019, p. 16). Typically, a population moves from the North further South which provokes a conflict between the newcomers and the original population (Onuoha, 2010, p. 34). It is a popular idea that farmer-herder conflicts are nothing new; however, historically there were mechanisms to solve disputes and prevent conflicts between both groups (Higazi, 2016, p. 373; Mercy Corps, 2019, p. 32).[116] In his study, Adam Higazi (2016, p. 370) shows how competition for land, water, and access to state could be dangerous. This also appears in the case of urban violence as, for example, in Jos and Plateau state after 2001 (Higazi, 2016, p. 373; Krause, 2011, p. 36). This is crucial because traditional ways of dealing with disputes among farmers and herders were destroyed by mobilisation along political and religious lines. This further gives rise to insecurity and competition over land, rights, and power between both groups (Higazi, 2016, pp. 373–374). Therefore, this could support the part of the path with high urbanisation rates and marginalisation. Mercy Corps (2019) adds importance to changes in group dynamics when young men are often disconnected from families or elders based on interviews.

> Respondents for the present study linked increasing numbers of fights, encroachment onto farmland and involvement in criminality with this change [change of the group structure]. Young men spoke about how their elders, female and male, used to caution against violence when young men wanted to retaliate against wrongdoing. (Mercy Corps, 2019, p. 21)

Traditional ways of solving conflicts do not work. Very often the reason is that pastoralists "leaders [are] seen as corrupt, politicised and biased" and therefore the traditional ways are not used (Ibid, p. 36). This further deepens the problem. In this regard, it is also the problem of the politicisation of the topic and political narratives that

[116] This topic is still rather understudied even though it is on the rise (see, e.g., Moritz, 2010; Krause, 2011; Higazi, 2016; Tade & Yikwabs, 2019)

appears in Nigeria (Ibid., pp. 33–34; 37–38). Various groups often label and scapegoat each other, particularly Fulani pastoralist, which further escalates the problems (Moritz & Mbacke, 2022). The topic of conflicts between farmers and herders is very complicating and multi-layer and while marginalisation and urbanisation could partially explain the rise of violence there are also other factors that further enhance the conflicts. In this respect, the existence of self-defence groups and a cycle of attacks and revenge is very important (Schmiedl, 2023).

The problem with the condition "access to water" appears here. Two possible explanations could be offered. The first, it is a fight for rights and access rather than an absolute amount of water. Other possible operationalisations could prove this. The second, it is important to highlight the problem with data on the state level here. In particular, rural areas could be problematic in case of water among the population. However, this path will be discussed more deeply in the case of Kenya which is unique and the most typical case for this term to further dismiss this term or prove it in the case of Kenya.

To conclude the case of Nigeria, we can argue that vulnerability to climate change is further exacerbated by marginalisation and corruption that is often used by armed groups like Boko Haram to mobilise support around Lake Chad. Climate vulnerability even further highlights the issue with land that is the main vehicle of livelihood. This dangerous mix easily turns climate change vulnerability into violent civil conflicts. While it is clear that none of the conditions, economic insecurity, marginalisation and mobilisation based on corrupt institutions, should be solely over-estimated as highlighted, for example by Thurston (2016); it seems that a mutual combination could explain this uprising. In the case of inter-communal violent conflicts, we can agree with the importance of marginalisation and urbanisation however good access to war as a condition for inter-communal conflicts seems implausible.

7.2.3 Brief conclusion

To summarise the two discussion cases, it is clear that marginalisation plays a significant role as the means for mobilisation and feelings of grievances in both of them. In the case of Somalia, this is even more exacerbated by the instability and dysfunctionality of the regime. Indeed, in this case, conflicts breed other conflicts. Dysfunctional government is

unable to deal with such problems as land degradation and its complete scarcity. Protracted violence, therefore, breeds poverty, endangers livelihoods, and further and further strengthens grievances and dissatisfaction. In such a situation, when climate change further destroys an already divided country, the conflicts are easy to erupt and continue. Indeed, it is political exclusion and marginalisation that seem to be the cornerstone of radicalisation at the start of the conflict and also its continuation.

This is further confirmed by Nigeria as the second case discussed. It is clear that climate change vulnerability is not the sole factor that causes conflicts in Nigeria. The opposite is true, marginalisation, government mismanagement in form of corruption, and issues with land that endanger livelihoods heavily contribute to insurgency in the Northern Territory. These conditions together form a mix that is used by groups like Boko Haram to mobilise support of upset and neglected population.

Both cases confirm that marginalisation and political mismanagement are important conditions that turn climate change vulnerability into violent civil conflicts. While in one case the mismanagement is rather the result of protracted violence, in another case it is the result of the oil dependence of the country. Marginalisation is truly problematic as well, in such a political environment. In the case of access to land, it is also clear that both in the case of Lake Chad and also in Somalia it is a huge problem. In the case of Somalia, appropriation of land even stood at the beginning of conflicts along with marginalisation, while in the case of Lake Chad, changes in the environment and issues with access to land seem to be similarly important. This mix of government mismanagement and marginalisation is therefore a turning point that directs countries to conflict as it prohibits any mitigation of climate change that further influences the issues with access to land. Conflicts in such an environment seem to be, therefore, very likely.

7.3 Ways to Violent Inter-communal Conflicts

Violent inter-communal conflicts exhibit a bit different dynamic than violent civil conflicts. The following subchapters will discuss two typical cases that came out of QCA, Sudan and Kenya. It is important to highlight that, same as in the case of violent civil conflicts, neither of them is a full-scale case study but rather a contextual discussion of typical cases. Therefore, the purpose of present typical cases is rather to highlight and discuss different logics of QCA solutions and further check their validity and possible problems.

7.3.1 Sudan: Inter-communal Conflicts in Darfur

Sudan has a long history of minor or major conflicts. Sometimes, some of these conflicts are argued to be related to ecological or environmental issues such as land scarcity or rising temperatures (UNEP, 2007; Olsson & Siba, 2013; Maystadt, Calderone, & You, 2015). Like in the cases discussed above, Sudanese conflicts are highly complex and intertwined. Local conflicts influence major civil conflicts and vice versa. It is not the purpose of this chapter to go into the history of every conflict in Sudan, which is rather the subject for a single book.[117] Instead, the main focus will be on Darfur and violent inter-communal conflicts in this particular area.

In general, conflictual situations in Sudan are very often related to the issue of land, land tenure, and access to resources. Sudanese inter-communal conflicts are no exception. However, in the case of the QCA solution, Sudan is a typical case for the path that consists of a rather high amount of arable land, water access, and inequality. The goal of this subchapter is to answer why this rather unexpected path appeared. As in the case of civil conflicts, it could be argued that the main cause is rather low equality. The issue of land and water here must be seen through this social pattern and through the role that mainly land plays in the identity of people living in Darfur and how through power relations the situation escalated to violent conflict. In the end, the total amount of arable land or the

[117] For a further discussion and history of Sudanese politics, see the work by Ryle, Willis, Baldo & Jok (2012). For a deep discussion of civil wars and other conflicts in Sudan, see de Waal (2007), and Prunier (2008)

amount of arable land per capita could be less important.[118] It is the tenure system and the clash of "traditional"[119] administration and central government to which land is especially important. Therefore, the pattern of access and power relation towards land and water is problematic from the point of view of relations between diverse groups (Abdul-Jalil, 2006).

Sudan is in a cluster of climate change-political vulnerability. The problem that Sudan has been facing for a long time is political ineffectiveness. It is relatively rich in resources, mainly oil. However, in the case of the average effectiveness of government in the monitored period, it dwells in 9th place among the most ineffective governments (Kaufmann, Kraay & Mastruzzi, 2010; Kaufmann & Kraay, 2020). The Sudanese government is not able to govern the country effectively and sometimes even politicises and manipulates topics and issues to reach its own goals. Typically, this is how identity, local governance, or land tenure administration in Darfur is manipulated in the way of a "divide and rule" strategy (de Waal, 2007, p. 14; 2005, pp. 200–201; Osman & Cohen, 2014, p. 6; ICG, 2004, p. 4). Therefore, the government uses these topics to secure its survival.

Undisputedly land and the land tenure issue are one of the main topics in Sudanese politics. It is always at the centre of many disputes as "customary" law clashes with "modern" laws (Tubiana, 2006, pp. 120–122). The government often uses the shortage of high-quality land to reward those who side with it (Pantuliano, 2009, p. 195). However, the land in Sudan is an inseparable component of identity and political and social power (Abdul-Jalil & Unruh, 2013, p. 156; Unruh & Abdul-Jalil, 2014, p. 107; de Waal, 2005). The name of one of the most conflictual areas in the world, Darfur, is a nice example of this. It comes from the system of *Dar* which is a historical land tenure system in Sudan. Darfur basically means "the *Dar* or homeland of the Fur tribe"[120] (Abdul-Jalil & Unruh,

[118] It is also important to note that the amount of arable land per capita is slowly decreasing (World Bank, 2020d; 2020e) so another reason of this unexpected condition could also be the static character of the methodology used.

[119] Similarly, to some other authors, I understand this term as "ambiguous" (Tubiana et al., 2012, p. 4). However, in this case it was decided to use it for easier differentiation between different kinds of authorities or law systems.

[120] The term *tribe* is often used in literature on Sudan even though it is controversial among Africanists. In this work, I rather use the term community that is in line with the use of the term inter-communal conflicts while sometimes in the case of Sudan, laymen and even experts use inter-tribal conflicts.

2013, p. 158).[121] This system was balanced and agreed upon by communities living in the area and helped to sustain their co-existence (ICG, 2004, p. 5; Osman & Cohen, 2014). Historically, the concept of *Dar* together with the *hakura* system[122] was able to relatively settle the situation like migration, settlement of immigrants, and rights between settlers and newcomers (Abdul-Jalil & Unruh, 2013, pp. 162–165; Tubiana, 2012, p. 231). Jérôme Tubiana (2012, p. 231) describes the system of *Dars* and *Hawakir*[123] as it "was not egalitarian nor fair, but it was stable and flexible." However, due to its non-egalitarian nature, it also set the stage for recent fights, as in a system of *Dars* and *Hawakir,* some groups found themselves in a disadvantaged position and use it as justification for fighting (Flint & de Waal, 2008, cited in Brosché, 2019, p. 660; Tubiana, 2006; Unruh & Abdul-Jalil, 2014, pp. 109–112; Flint, 2010, p. 11; Leonardi & Abdul-Jalil, 2012, pp. 191–192).

In the case of Sudan, the land is also problematic due to environmental and climate-based issues. Desertification and general degradation lead to land transformation that ultimately influences the livelihood of people in Sudan (UNEP, 2007, pp. 62–64). Floods and droughts are nothing new (Ibid., p. 58). A great number of people in Sudan suffer almost every year from at least one of them (see Figure 19). From a climate change point of view, the temperature has increased, and precipitation has been reduced and this trend should continue even in the future (World Bank Group, 2020d). Such changes require strong intervention from the government in the case of adaptation. However, with its ineffectiveness, this is not possible and therefore it easily impacts economics and the way of living, particularly agriculture which is the main source of living in Sudan (UNEP, 2007, p. 10). From a "Malthusian" point of view the population of Sudan is growing steadily (World Bank, 2020d). This could lead to "Malthusian" stress. The simplification of the conflict over scarce resources is then a tempting explanation. This is often used by the central government (Sørbø, 2010, p. 175). Climate change clearly historically but also

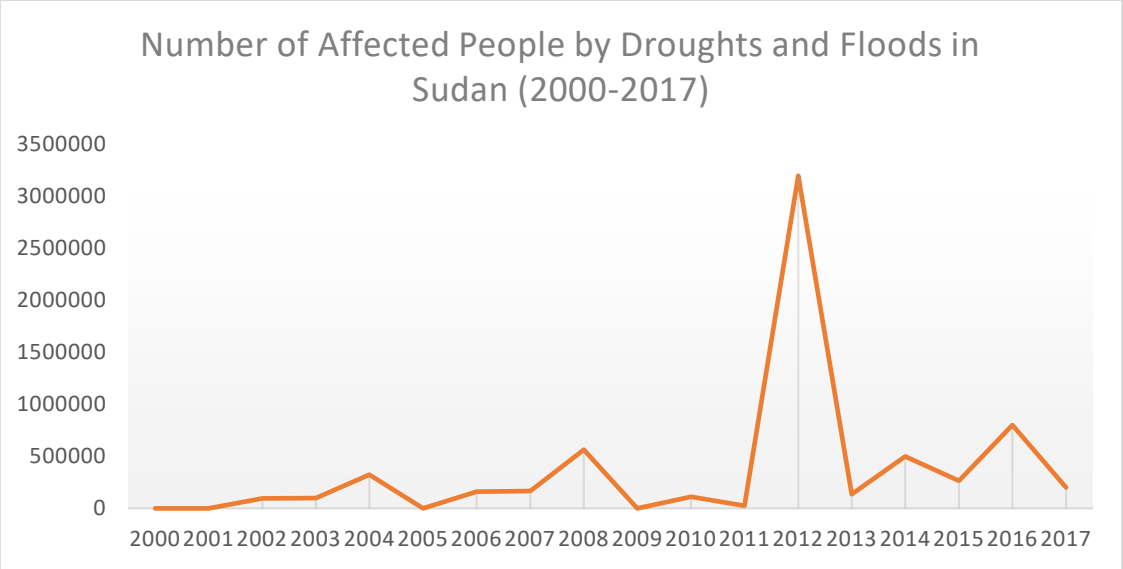
[121] For a closer discussion of the customary land system in Sudan, see Abdul-Jalil and Unruh (2013), Brosché (2019), Flint (2010), Tubiana (2012), and Tubiana et al. (2012).

[122] *Dar* was "more of an administrative system than one of land tenure" even though connected with some community (Tubiana, 2012, p. 230) it was "multi-ethnic" (Tubiana, 2006). *Hakura* was land that "the sultan distributed to individuals at their leisure: traditional leaders, noblemen, religious men and traders from elsewhere, of all origins" (Ibid, p. 231).

[123] Plural of *hakura* (Tubiana, 2012, p. 231).

recently influenced livelihood and conflicts in various ways;[124] however, it was "bad governance" that directed climatic impacts to violence (de Waal, 2007). Climate change vulnerability, a lack of political effectiveness, and the continual conflicts make Sudan extremely vulnerable.

Figure 19 Number of People Affected by Droughts and Floods in Sudan (2000-2017)

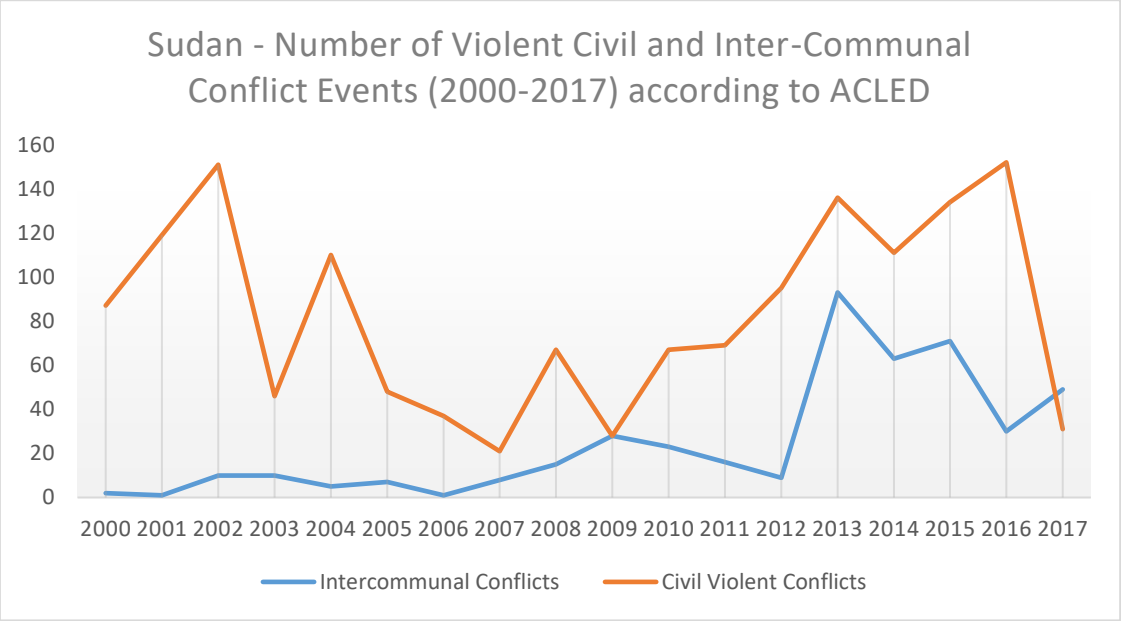


(Source of data: EM-DAT, 2020)

However, why does it seem that Sudan is a typical example of a solution path which combines a rather high amount of arable land, relatively good access to water and inequality? The reason could be a methodological issue and the static character of the approach that is used. However, we can also see the issue with land from an institutional point of view. The explanation could fall into a combination of elite strategy and an unequal approach in combination with an environmental explanation, as each tells part of the story (Brosché, 2014, 2022; de Waal, 2007). The issue of the distribution of these resources between areas and communities in Sudan seems to be far more influential than the absolute or relative amounts. In addition, it has to be seen in the context of the politics of the central government. To explain all of this, we have to take a look at the history of not only inter-communal conflicts but also violent civil conflicts and the way they mutually influenced each other.

[124] Sørbø (2010, p. 181) for example highlights how droughts influenced the mutual interaction between Abbala and Baggara Arabs.

Figure 20 Sudan - Number of Violent Civil and Inter-communal Conflicts Events according to ACLED



(Source: ACLED, 2020; Raleigh et al., 2010)

Since independence, Sudan has suffered from various conflicts. From bigger ones such as a civil war[125] which resulted in the independence of South Sudan in 2011, through the civil war in Darfur that started in 2003, to diverse inter-communal conflicts in different parts of Sudan. All of them somehow influenced the momentum of the others and it is almost impossible to see them separately. The intertwined connection is clear in the way civil war influenced radicalisation in Darfur where the central government intentionally mobilised Arab communities with the purpose of getting support in the north-south civil war (Brosché, 2014, p. 75). For a long time, the central government preferred and supported Arab communities in this already marginalised periphery of Sudan. This resulted in the administrative "Arabization" of the region when the central government decided to divide Darfur into three regions in 1994 which is according to Johan Brosché (2019, p. 663) "a prime example of the government's anti-Fur policy." It is therefore not surprising that in 2003 the Sudan Liberation Movement/Army and Justice and Equality Movement started the war against the central Sudanese government. This

[125] In this regard, the term war is used as there is no dispute that in this case we can clearly use this label.

was the result of the long-time marginalisation of the region,[126] a governmental unequal approach to Arab and African communities,[127] and a complex violation of traditional institutions in the region (Olsson & Siba, 2013, p. 300; Brosché, 2019, pp. 663–664, 2022, pp. 9–11).

The central governments favoured Arab groups for a long time already in inter-communal conflicts, and disputes or stepped back from their resolution before the Darfur rebellion (Brosché, 2019, p. 664, 2022, p. 18; Tubiana et al., 2012, p. 70; Tanner & Tubiana, 2007, p. 15; ICG, 2004). In his great study of inter-communal conflicts, Brosché (2022) aptly highlights how institutions and the behaviour of the central government resulted in conflicts in Darfur while eastern Sudan stayed relatively calm. To summarise his conclusion, it is clear that the intervention of the government in local rules, land administration, dispute resolution, and "divide and rule" strategy (differentiation between Arabs and non-Arabs) generated wheels of violence.

At the heart of this is the problem with the land. As mentioned above, the land is important for several reasons. However, as Tubiana et al. (2012) highlights, it also has a role in conflict resolution as

> the Native Administration is deeply connected with the land-tenure system. Historically, most leaders in Darfur, at all levels of the hierarchy, were territorial leaders, and most of the territory was divided into entities administered by them. Most leaders are also often but not necessarily owners of land, sometimes equivalent to the territory they administer, but often smaller. They also play a role in resolving both intercommunity conflict over large territories, often in the context of reconciliation conferences, and individual conflicts over smaller plots of land, directly or through the customary courts. (p. 6)

[126] The marginalisation of Darfur was highlighted in *The Black Book of Sudan*, that could be seen as pamphlet of one of the rebel movements. However, its conclusions were supported in a paper by Alex Cobham (2005).

[127] The labels are used even though it is important to highlight that neither of these groups is monolithic as is clear from their intra-group clashes. The groupings present rather a simplification that appeared in the end of the 1980s with the label "zurga (blacks)" (Flint, 2010, p. 9).

This system was intervened in by central governments, as mentioned above, and land and water resources started to be a part of disputes mainly of those who were in marginalised positions, both farmers and herders. However, it cannot be simplified to a farmer-herder conflict or non-Arab versus Arab groups because through time (due to civil war) the pattern changed and now it is very often inter-herder/pastoralist conflicts and inter-Arabs clashes or inter-non-Arabs conflicts (Brosché, 2019, p. 666, 2022, p. 11; Flint, 2010; Gramizzi & Tubiana, 2012, p. 13). Actually, according to Julie Flint (2010, p. 7) "[i]nter-Arab fighting has been the single largest cause of violent death in Darfur since the Darfur Peace Agreement (DPA) of May 2006." We can track various reports of events of inter-communal conflicts. For example, in July 2006, the Sudan Tribune reported several deaths as a result of inter-communal "fighting for control over grazing land in the area" ('230 killed or injured in', 2006). In another example, it is reported that due to clashes between two groups over local resources and "cattle theft" up to 150 people were killed in South Darfur ('From 70 to 150 people', 2008). In some cases, the Sudan Tribune even reports on clashes, as "[t]he regular conflicts between the two Arab nomad tribes occur in the restive and arid province over the pasture and water sources […]" ('Over 20 people killed', 2010). Sometimes, inter-communal violent conflicts are historical such as the one between Rezeigat and Ma'alia groups, both being pastoralist communities fighting over land ('Six killed in fresh tribal', 2017).[128] Another example is the violent clash between farmers and pastoralists in November 2016 in Goghana where mutual attacks between farmers and herders resulted in several deaths and which Sudan Tribune attributed to "conflict over water and land in the arid region" ('10 people killed', 2016). Many other examples could be presented. However, they have one in common: access to resources, e.g., land and water. To understand this, we have to go back to the above-mentioned issue of *Dars* and complex relations between inter-communal conflicts and civil conflicts.

The system has changed several times and has influenced power relations and the distribution of land. One change occurred in 1970 when the Sudanese government changed the legal land system (Abdul-Jalil & Unruh, 2013, pp. 169–170). The law claimed that "all land that is not registered before the enactment of this law becomes the

[128] Clashes between these two groups dates back to 1960s (Flint, 2010, p. 9).

property of the government by default" (Abdul-Jalil, 2006, p. 18). The "traditional" land tenure rights were substituted by "market mechanisms" (Osman & Cohen, 2014, p. 9). Before this law, it would be usual that people coming to the area would have to be granted land; however, after the introduction of the law, they could simply claim the land as the result of different and competing land laws (Ibid., pp. 17–18). Later, this already sensitive issue was even further escalated as the central government "manipulated ethnicity in the interests of central politicians and their provincial allies" (ICG, 2004, p. 4). Simply put, marginalised groups, groups without access to *Dars*, now started to use the law and claim the land. This resulted in often inter-communal conflicts between those with access to resources and in a favourable position and those marginalised (Brosché, 2019, pp. 663–664; ICG, 2004, pp. 5–8). Land and water resources have also been politicised to get support. This happened, for example, in the above-mentioned mobilisation of support of Arab communities in the north-south civil war or after the Darfur uprising when "landless Arab communities" sided with the central government (Brosché, 2019, p. 665). After the start of the Darfur rebellion, conflicts between groups that were somehow in a favourable position and those that were marginalised also appeared. Examples are clashes between Abbala (without land rights and marginalised) and Baggara (with land rights) herders that have roots in 1970 but are still active and manipulated by the government in the way it needs (Flint, 2010). On the other hand, we have inter-non-Arab fighting in which marginalised smaller groups have been manipulated against the largest group Zaghawa (landowner) and the main group of rebels that is in the eyes of other small non-Zaghawa groups seen as favoured by rebel movements (Gramizzi & Tubiana, 2012). This was even more highlighted when rebels were seen as perpetrators of violence against civilians (Tanner & Tubiana, 2007, p. 39; Gramizzi & Tubiana, 2012, pp. 18, 24). In both cases, the inter-Arab and inter-non-Arab conflicts could be understood through access to resources, mainly land and water, and political marginalisation which is further manipulated by the central government. In this regard, Flint's (2010) apt conclusion about inter-Arab conflicts could be used in both cases:

> it is the result of the breakdown of governance, magnified by the highly competitive, and increasingly violent, play between different groups seeking land, access to land, and the basic services that are perceived to flow from land. (p. 31)

We must understand inter-communal violent conflicts in Sudan as part of the broader picture where access to resources, mismanagement, government manipulation, and marginalisation influence different types of conflicts. Also, violent civil conflicts/wars influence the emergence of inter-communal violent conflicts and vice versa as the government uses and intentionally highlights marginalisation and ethnicity in their gains to have support in its own conflicts against rebels or to hinder possible coalitions against it. As the path of which Sudan is part of consists of a rather high amount of arable land, relatively good access to water, and inequality, we have to partly adjust it. First of all, we cannot decline the possible influence of the skewed distribution of data, limited sample, and possibly not suitable proxy operationalisation. On the other hand, we have to acknowledge the importance of marginalisation that possibly directs an area with relatively accessible to water and land to conflicts. Some groups are in a favourable position and have/had good access to land and water resources, mainly those with *Dars* or those who claimed it under the unclear land tenure system and with support from the government (could be previously in a marginalised position and now in favourable position). It is therefore a political strategy of the government that sets ethnic groups against each other on claims of unequal access to land.

This complicated context leads to conflicts. Sometimes, harsh conditions, such as droughts, put added pressure on this situation as various groups move from one area to another. These *newcomers* under the unclear land tenure laws then problematise the access and ownership as the system is now more competitive than cooperative or symbiotic (Osman & Cohen, 2014, p. 8). To conclude, it is rather the inequality of the land system that influences the access to land and water than the absolute or relative amount of those resources. Although it is arguable whether Sudan has rather good access to water and land, it is clear that both these resources matter in case of inter-communal violence; however, they are heavily influenced by the equality of access and general equality of access to power. Vulnerability to climate and environmental change is directed by these structural and institutional problems. Diverse catastrophes such as droughts are here, rather, added pressure. Pressure that already influences the mobility of both farmers and herders. In the case of very problematic land and water rights, in general access to resources, inequalities, and the form of strategic behaviour that the Sudanese government uses, the climatic catastrophes and further climate change could possibly be more and

more important. Now, it is rather the contextual background and complementary factor of institutional and structural factors that are in play.[129]

[129] It is important to note that the latest development in Sudan added another level to inter-communal violent conflicts. After the fall of the al-Bashir regime, different influential groups are now fighting over the government. This will probably further influence the whole dynamic of inter-communal violent conflicts connected to access to land and manipulated around ethnic boundaries and marginalisation.

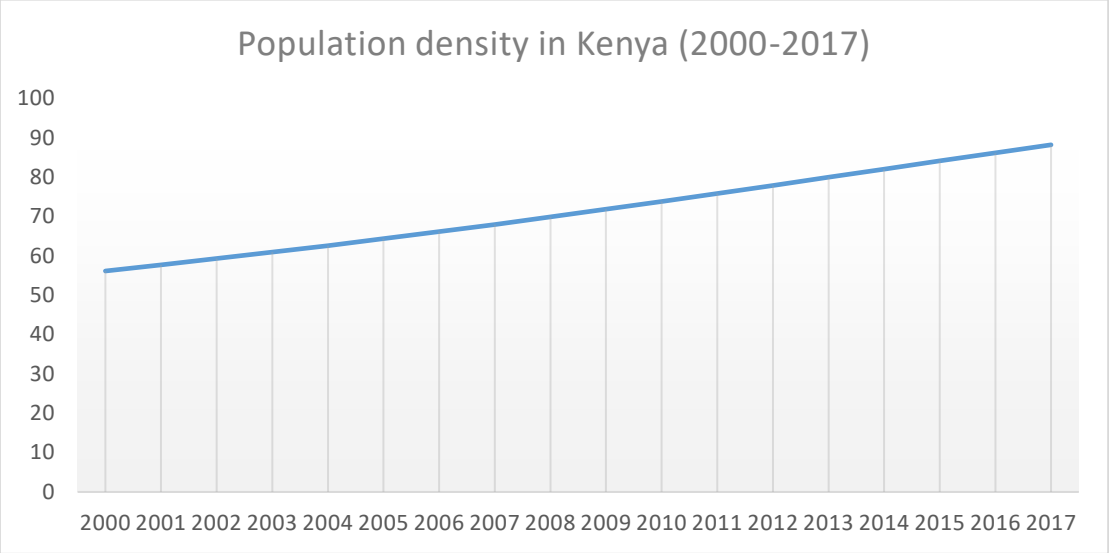
7.3.2 Kenya: Land Issues in the Heart of Electoral Violence

Kenya is a very specific case in the set of countries discussed in this dissertation. From the cases discussed so far, it is probably the closest to democracy. Also, when we compare it with the previous three countries above, it clearly suffers from the lowest number of conflict events, both civil and inter-communal. While violent civil conflicts are rare, inter-communal violent conflicts occur very often particularly in times around elections. This fact makes Kenya particularly interesting. Also, the fact that it is a typical case for a path that contains a combination of rather good access to water, rather high urbanisation and rather low equality, which seems to be a plausible path only partially when compared with the rich scholarship on the topic of violence in Kenya (cf. Kahl, 2006; Lind, 2003; Eriksen & Lind, 2009; Boone, 2011; Anderson & Bollig, 2016, Bollig, 1993). The diverse explanatory ways will be discussed below, while the main focus will be on electoral violence around the elections in 2007-2008 and the history of land issues that were behind it. However, as in other cases, this part will first discuss the general vulnerability to climate change of the country.

It is clear that Kenya is not vulnerable due to its political or economic situation. It is part of the group of countries that are vulnerable due to population density. Therefore, the reason behind its vulnerability is the most "Malthusian" of the possibilities. This is clear from brief consultation of Fig. 21 as we can see that the population density steadily grew during the monitored period. Kenya is also the subject of heavy climate change as in the last years the temperature in the country is steadily growing (World Bank Group, 2020), while at the same time people are heavily exposed to droughts and floods (see Fig. 22). Climate change makes the weather more unpredictable. Kenya is not the subject of rainfall reduction; however, predictability and variation are becoming a problem (Schilling et al., 2014, p. 245). The same problem is also the occurrence of catastrophes as they lead to unpredicted migration, problems with food distribution, but also heavily accentuates inequality as documented by Elliot Fratkin and Eric Roth (1990) using the example of the drought in 1984. Due to the growing population and exposure to climate change followed by land degradation, it is not surprising that the amount of arable land is declining (Fig. 23). This problem was already discussed in the early millennium, for example, by Colin Kahl (2006) who in his book highlights populational pressure and

climatic-environmental issues that lead to problematic land issues, urbanisation and pressures on government.[130]

Figure 21 Population Density in Kenya

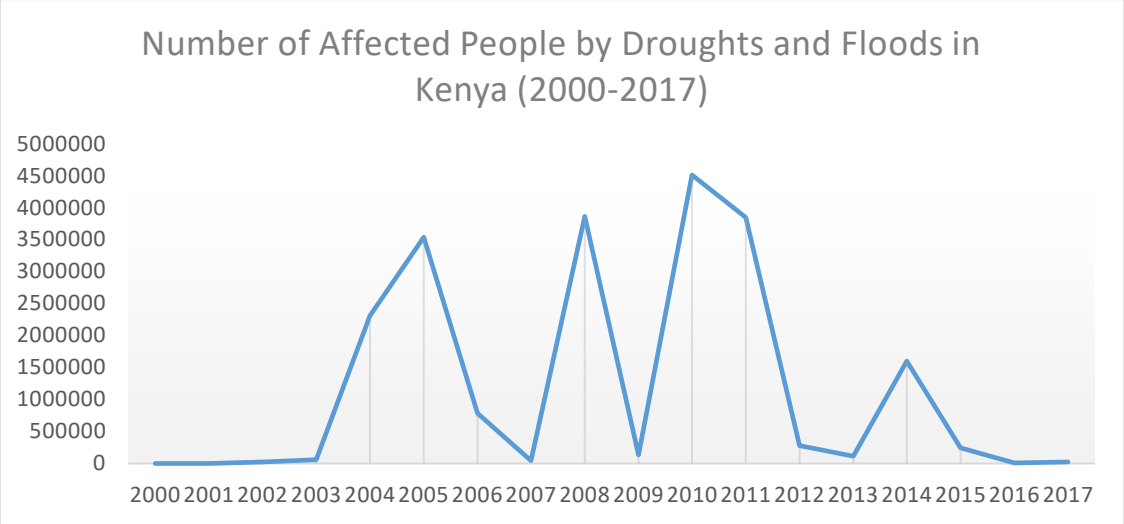


(Source: World Bank, 2020j)

As in the case of Sudan, socio-environmental pressure is not only an issue of the latest period. Kenya is struggling with a rapidly growing population and its pressure on access to land rights from independence, as it was the object of political struggles and violence due to colonial history, but also due to the politics of the new elite after independence (Boone, 2011, p. 1321; Anderson & Lochery, 2008, p. 329; Kahl, 2006, pp. 139–141). Clearly, to fully understand inter-communal violence in Kenya, we need to understand the colonial history, the way the land and land tenure system was treated after independence, and also how democratisation, devolution, and elections changed the political fight for political power.

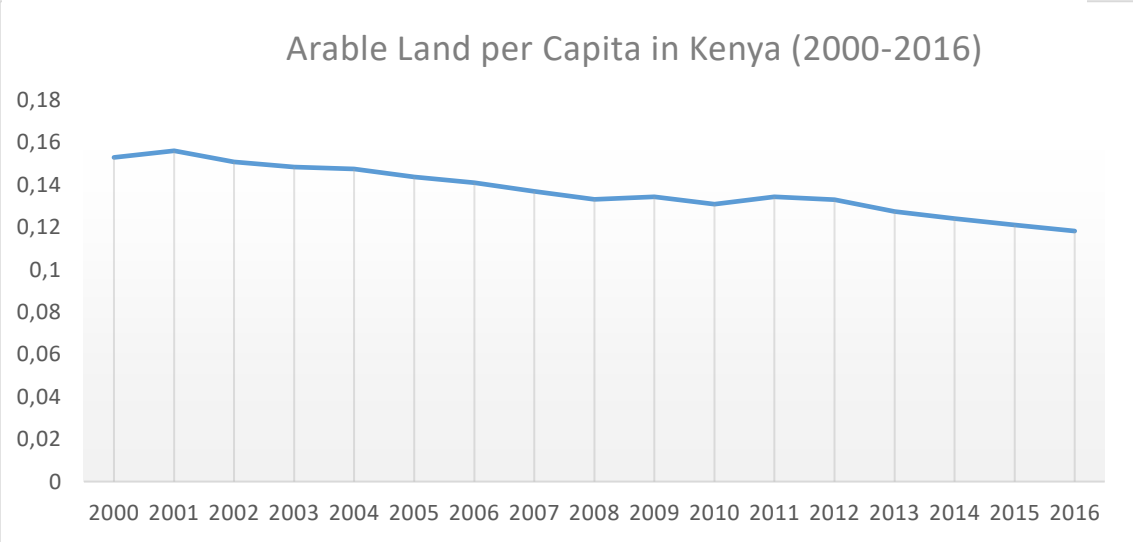
[130] It is important to note that for Kahl (2006, p. 162), scarcity thesis is not able to fully explain violence in Kenya as he rather accepts support of "the state exploitation hypothesis."

Figure 22 Number of People Affected by Droughts and Floods in Kenya (2000-2017)



(Source of data: EM-DAT, 2020)

Figure 23 Arable land per capita in Kenya (2000-2016)



(Source: World Bank, 2020f)

Historically, Kenya was a settler colony of the U.K., which means that the land was owned by European settlers who used Africans as labour (Boone, 2012, p. 79). In a colonial setting, many Africans were "forced" to migrate to work on farms owned by Europeans (Kahl, 2006, p. 139–140). This has quickly changed with independence when Europeans sold the land to Africans. This occurred in the background of a debate on the form of the restitution. Politicians have been divided into two camps. While Jomo Kenyatta and KANU opportunistically pushed for open restitution for all Kenyans, Daniel

arap Moi and KADU were in favour of "majimboism" (Boone, 2012, pp. 82–83; Klaus & Mitchell, 2015, pp. 628–629; Anderson, 2005). *Majimboism* could be seen as regionalist politics (Boone, 2012, p. 83), as the translation of "the Swahili term *majimbo*" means "region" (Anderson & Lochery, 2008, p. 329). This Kenyan politics has its roots in late 1950s and early 1960s and was partially focused on "[t]he mobilization of the smaller ethnic groups […] against the dominance of the larger, wealthier and better-educated Luo and Gikuyu" (Anderson, 2005, p. 552). This political clash was heavily reflected mainly in the Highlands in the case of land restitution, and it was the main topic of the first general elections in 1961 (Ibid, pp. 553–554). However, the election was won by KANU and the proposed *majimboism* of KADU was rejected, and later on KADU was absorbed by KANU (Anderson & Lochery, 2008, p. 330; Boone, 2012, p. 84; 2011, p. 1323; Anderson, 2005, p. 563).

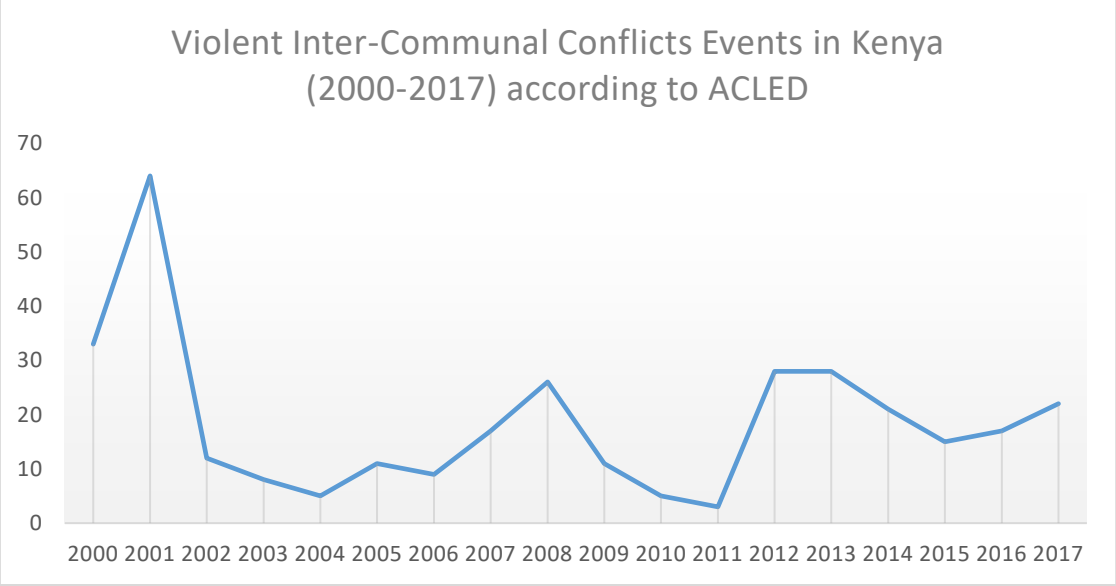
This did not mean an absolute end of *majimboism*, as it was effectively revived in 1990s by no other than Daniel arap Moi when land became the topic of a political fight once again as the topic of an election campaign (Boone, 2012). In the 1960s, the land restitution was solved with the use of so-called "settlement schemes" and "land-buying companies" that served Kenyatta as a space for the patronage system (Boone, 2011, pp. 1321–1326).[131] The topic of land and its politicisation did not end with the submission of KADU to KANU. Throughout the years, politicians used power over the land as a reward for supporters and built a clientelist system of rewards (Anderson & Lochery, 2008, pp. 335–336; Klaus & Mitchell, 2015, p. 629; Boone, 2012, pp. 80–81). In the Rift Valley, part of the Highlands, the system opened doors to "outsiders," mainly Kikuyu, which resulted in clashes with local Kalenjin and Maasai (Klaus & Mitchell, 2015, p. 629; ICG, 2017, p. 2). It is important to note that Kenyatta himself was Kikuyu, while Moi, first his political opponent, and then vice-president was Kalenjin (ICG, 2017, p. 2). As Catherine Boone (2011, p. 1323) aptly notes: "those who claimed to be the 'original inhabitants of the Rift'—were politically marginalized. Their demands for restitution of land that had been taken by the colonial state were not recognized." In summary, the settlement schemes and politicisation of the land rights created a situation where two groups claimed rights to land (Klaus & Mitchell, 2015, p. 629). The land conflict also had an ethnic side.

[131] The Ndungu Report published in 2004 clearly showed how regimes under Kenyatta and Moi took advantage of power over land and state institutions (Southal, 2005).

This is the reason why the conflicts in Rift Valley are sometimes seen as ethnic while it is more of a land conflict that is ethicised as we will see below.

In the 1990s, it was Daniel arap Moi who was president from Kenyatta's death in 1978. However, the problems of the political system did not fade away while he was in the president's office. The topic of land came up in the multiparty elections in the 1990s as politicians decided to use the land card once again (Kahl, 2006, pp. 119–124; Boone, 2011). Clearly, violence, and violent inter-communal conflicts become ordinary around the time of elections, as pre- and post-election violence. We can see it heavily in 2007-2008 (election in December 2007), and in a minor way 2012-2013 (2013 elections) and 2017 elections (Fig. 24.). Even though there is a clear peak in the number of inter-communal violent events in the case of 2001, according to a conceptualisation of this thesis, the 2002 elections were rather calm from the point of electoral violence.

Figure 24 Number of Violent Inter-Communal Conflicts Events (2000-2017)



(Source: ACLED, 2020; Raleigh et al., 2010)

It would be easy to identify multiparty elections as the cause of violence. However, as we know that the topic of the politicised land issue was the cause of disputes before the introduction of multipartyism, it is clear that we have to look at the way politicians used this topic to mobilise support; the way the land issue was ethnicised as a political weapon. Already in the 1990s, when the *majimboism* appeared once again and when arap Moi mobilised his supporters, it was clear that the 30-year old topics and disputes had not

disappeared (Boone, 2011, pp. 1314–1315). The worst thing about the 1990s conflicts is the fact that the state clearly participated in igniting the conflicts, as Boone (2011) aptly notes:

> Ruling party politicians and agents of the provincial administration did not rely on the rhetoric of land grievances alone to spur their supporters to action or incite violence. They used resources of the state to equip, deploy, direct, and protect the Maasai and Kalenjin "warriors" who were at the forefront of the house burnings, killings, expulsions, and land seizures. (p. 1327)

This is also supported by Kahl's (2006, p. 162) conclusion that the 1990s violence in Kenya is the result of state exploitation, therefore, Kenyan politicians used the violence as "an effective means of achieving these goals" and "crushing political opponents" (Ibid., p. 50). As mentioned above, the 2002 elections were not heavily disputed, but this changed in 2007. The 2007 elections were different in many ways: disputed, brought new cleavages, employed new technologies, and pre-election polls (Cheeseman, 2008, pp. 168–170).

The fight between Mwai Kibaki and Raila Odinga was bloody not only in the case of violent inter-communal conflicts but also in all different cases of violence, militia fighting and conflicts that almost grew to a civil conflict. The campaign was strongly polarised due to mobilisation around ethnic lines (Kalenjin and Luo in the case of Odinga and Kikuyu by Kibaki). The spark of the violence occurred immediately after the results and win of Kibaki were announced on 30 December by the head of the Electoral Commission, Samuel Kivuitu, who was later called "The man who was at the centre of Kenya's darkest hour" by the Standard ('Samuel Kivuitu', 2017). The elections were very close, contested by observers, and Odinga called them rigged (Gnecchi & Wallis, 2007; 'Nightmare in Nairobi', 2008). As Nic Cheeseman (2008, pp. 176–177) observed, there was too much ambiguity about the elections to have no doubts about the fairness, as he points to reports by EU observers, but also to a comparison of parliamentary and presidential elections. This was further supported by an awkward note by Kivuitu on 2

January 2008: "I don't know who won the elections" ('Samuel Kivuitu', 2017).[132] The media around the world were full of reports on violence spreading through Kenya, particularly the Rift Valley (see, e.g., 'Renewed Kenya clashes', 2008; Gettleman, 2008; Rice, 2008; Cocks, 2008). The clashes were built heavily along ethnic lines (Kalenjin and Luo against Kikuyu), which were mobilised by both politicians together with land grievances and once again renewed *majimboism* which was the main card of Odinga's campaign (Anderson & Lochery, 2008, pp. 329–330; Klaus & Mitchell, 2015, p. 629; Boone, 2012, p. 91; Cheeseman, Lynch &Willis, 2014, p. 5).[133] Indeed, the constitutional reform and associated land tenure issue were an important part of the campaign (Cheeseman, 2008, p. 175) even though Odinga and the whole "Orange movement tried to dissociate itself from the violent and ethnic chauvinist stigma attached to the *majimbo*" (ICG 2008, 5). As it is clear, this did not help as parts of his coalition were more radical. Even, Kenya National Commission on Human Rights (2008, p. 7) admitted that "violence was financed and sustained mainly by local politicians and business-people." Similarly, some testimonies in the report of the Commission of Inquiry into Post-Election Violence claimed the same (Government of Kenya, 2008, p. 6). The manipulation, ethnic rhetoric and also direct involvement or organisation of violence by local politicians were also confirmed by Human Rights Watch (2008, pp. 36–39) or UNHCR (2008, p. 10). In the Human Rights Watch report, it is clearly highlighted that

> in the days prior to the election, local elders and ODM organizers in many communities around Eldoret called meetings where they declared that electoral victory for Kibaki would be the signal for "war" against local Kikuyu. (Human Rights Watch, 2008, p. 37)[134]

[132] Some sources quote the sentence this way: "I do not know whether Kibaki won the election" (Jopson, 2008; 'Nightmare in Nairobi', 2008).

[133] Even though the conflict was built along ethnic lines it is important to highlight that it was not an ethnic conflict. This mobilization was rather the way to "embody other societal divisions, such as regional inequalities, control over land, and access to political opportunities" (Branch & Cheeseman, 2010, p. 3).

[134] For deeper examples of crimes committed during post-election violence, see the reports of Human Rights Watch (2008) or UNHCR (2008).

Similarly, UNHCR (2008, p. 10) stated that "Kalenjin's initiation ceremonies had been organised in October/November instead of late December, reportedly to prepare the youths for elections-related violence."

Therefore, we can see how the population was mobilised by politicians on the basis of land issues and topics of devolution along ethnic lines.[135] This led to great inter-communal violence and other types of violence with heavily contested elections. The whole post-election violence went so far that Uhuru Kenyatta and William Ruto were prosecuted by the International Crime Court (ICC). This factor was later significant in the 2013 elections (Long et al., 2013; Lynch, 2014). These elections were the first after the constitutional reform in August 2010. The new constitution brought immense change to the system and powers of the president and was an attempt to decentralise Kenya (Cheeseman, Lynch & Willis, 2014, 2016; Long et al., 2013, p. 143). Although the new constitution, as the result of an elite agreement after the bloody 2007 elections, changed the powers of the president, created institution of governors, and was seen as a way how to lower marginalisation (Cheeseman, Lynch & Willis, 2016), the shadow of the previous election was still around in 2012 and 2013. The trauma was still visible and was apparent even in the campaign as many elites called for peaceful elections (Cheeseman, Lynch & Willis, 2014, p. 4).

The elections were different again in many ways; the first after devolution, introduction of the new electoral committee, the prosecution of two prominent politicians (Kenyatta and Ruto) and the alliance of Kikuyu and Kalenjin (Cheeseman, Lynch & Willis, 2014). We can highlight mainly two factors: the prosecution of Kenyatta and Ruto and the maybe unexpected alliance of Kikuyu and Kalenjin who were the main enemies of all previous elections. However, we can agree with Cheeseman, Lynch & Willis (2014, pp. 3–4) that the overall lower level of violence in the elections was caused by the prosecution of Kenyatta and Ruto, the "pervasive 'peace narrative'" and democratic and constitutional reforms.[136] The prosecution of Kenyatta and Ruto brought the two

[135] There were many other mobilizing topics and factors that were significant. See for example Cheeseman (2008), Bratton and Kimenyi (2008) or Kavulla (2008)

[136] Electoral violence, which would also count other types of conflictual events, was in total lower than in 2007 even though in case of the total inter-communal conflict events we can see that it was roughly the same as in 2007 – see Fig 24.

politicians who were on the other side of the barricade in the last elections under one flag (Lynch, 2014; Cheeseman, Lynch & Willis, 2014, p. 4). Ruto, a prominent Kalenjin politician, used to be a strong supporter of Odinga in 2007, however soon after he started to feel betrayed by Odinga as there was a strong feeling that "Luo leader [Odinga] had abandoned the Kalenjin who had 'fought for him' in 2007/08" (Cheeseman, Lynch & Willis, 2014, p. 7).

When Kenyatta and Ruto were prosecuted by the ICC this situation brought them together to form what Gabrielle Lynch (2014) called the "alliance of the accused." These two politicians formed a coalition that brought Kikuyu and Kalenjin together under the Jubilee Alliance. They have even been able to turn the prosecution to their own advantage, as Lynch (2014) aptly highlight. As she notes: "Jubilee managed to reframe the ICC story – at least in the eyes of a significant number of Kenyans – into a performance of injustice, neo-colonialism, and threat to the country's sovereignty, peace, and stability" (Lynch, 2014, p. 105). This strong anti-colonial and anti-patronizing narrative was important for the campaign of the Jubilee alliance and received a lot of attention by Kenyans as Lynch (2014, p. 106) continues: "The message clearly appealed to a broad range of Kenyans given a history of colonialism and the often hypocritical, patronizing, and unhelpful interventions of external actors".

Altogether, now with Kikuyu and Kalenjin on the one board, the electoral violence had a lower level and appeared mainly before elections (Long et al., 2013, p. 149). Actually, when we check the ACLED database, none of the events of violent inter-communal conflicts can be directly connected to electoral violence in contrast with the 2007 elections (ACLED, 2020; Raleigh et al., 2010). In summary, the elections did not bring any inter-communal conflicts even though after the experience with the 2007 elections many have been worried that the situation will happen again due to the fact that many problems, for example, the land tension was not solved (Human Rights Watch, 2013). The election ended up with very close results as Kenyatta gained the presidentship (Long et al., 2013, p. 140). Even more in 2015, the ICC stopped charges against Kenyatta and in 2016 against Ruto (ICC, 2015, 2016).

The last election that occurred in the time span of this work was in 2017 and again none of the violent inter-communal events can be connected to elections (ACLED 2020;

Raleigh et al., 2010). These elections were again heavily disputed, as the Supreme Court overruled the results of the elections and cancelled them, and the second elections were boycotted by Odinga, which led to an easy win for Kenyatta (Houreld & Miriri, 2017).[137]

To sum up, electoral violence, of which inter-communal violent conflicts are part, was in this sense partially a result of a history of *majimboism* and land issues in the Rift Valley, but also of other social and political cleavages. As noted by Mueller (2008, quoted in Cheeseman et al., 2019, p. 216), there was an important influence of "winner-takes-all politics." Politicians and society understood the elections as an opportunity to win the political power or lose it and become marginalised. This was connected to the topic of *majimbo* mainly in the Rift Valley where the fight over power was embodied into elections in which politicians mobilise ethnic groups (Branch & Cheeseman, 2009, p. 21). This way of politics led to bloodshed in 2007–2008 and also during multiparty elections in the 1990s. However, this fact was actually missing in 2017 as a result of both a new constitution from 2010 but also "a classic informal – i.e. unwritten and uncodified – institution" (Cheeseman et al., 2019, p. 217). In case of violent inter-communal conflicts in electoral violence, we can see clearly the role of marginalisation, land issues and abuse of these topics for mobilisation by politicians.

As already mentioned, many conflicts in the set are not connected to elections. This leads us to the often studied inter-communal violent conflicts connected with cattle-raiding mainly between Turkana and Pokot that are often connected to ecological and environmental explanations (see, e.g., Lind, 2003; Anderson & Bollig, 2016; Eriksen & Lind, 2009; Schilling et al., 2014). In general, diverse studies focus on different factors in pastoral conflict and conflict management like access to resources or dowry (Schilling, Opiyo & Scheffran, 2012), marginalisation and resource scarcity (Scheffran, Ide & Schilling, 2014), cooperation and adaptation processes (Eriksen & Lind, 2009), raining conditions (Witsenburg & Adano, 2009), commercialisation (Buchanan, Smith & Lind, 2005), the role of NGOs, peacekeepers and theft and revenge (Eaton, 2008, 2008a), wildlife conservation (Greiner, 2012) or even the role of local institutions (Adano et al., 2012). Most of the research on cattle raiding and inter-communal violent conflicts

[137] The latest elections in 2022 were again disputed as Odinga again faced Ruto and the elections had to be confirmed by the Supreme Court (Olewe, 2022)

connected to it focuses on the area in the Rift Valley and relationships between Turkana, Pokot, and Samburu (cf. Eriksen & Lind, 2009; Lind, 2003; Schilling, Opiyo & Scheffran, 2012; Schilling et al. 2016). Today, mainly an ecological and environmental explanation is very popular, however, it is far too simplistic (Buchanan-Smith & Lind, 2005, p. 10; Bollig, 1993, p. 182).[138] It is clear that these conflicts are multicausal and we can link them to diverse explanations, which are mutually interconnected.[139]

Raiding is not historically new, it has a cultural meaning and is connected to specific rituals and rules (Bollig & Österle 2008, p. 23, pp. 28–31; Buchanan-Smith & Lind 2005, p. 7). However, over time, the politicisation of ethnicity, a greater proliferation of weapons, the weaker role of elders but also international aspects and other factors led to a change in the nature of raiding (Mwangi, 2008; Greiner, 2013; Buchanan-Smith & Lind, 2005; Sharamo, 2014). According to some authors, today, conflicts "have escalated not only in terms of the level of violence, but qualitatively: killing itself is an aim, deliberately targeting both women and children, often involving rape – traditionally this would have been taboo" (Mwangi, 2008, p. 82).This is connected with a change of "elders' power" over raids and on the other hand the growing importance of national and local politicians (Bollig & Österle, 2008, p. 31)

This fact is partially connected to the above-mentioned 1990s rebirth of the politics of *majimbo* which did not influence only electoral violence, but also inter-communal violent conflicts among pastoralists (Greiner, 2013, pp. 221–222). In this way, the national politics mirrored itself in local conflicts. Oscar Mwangi (2008, pp. 87–88) aptly points to the fact that from-above imposed "political ethnocentrism" is the key in factor in radicalisation. The problem is that raiding or the act of violence from one side often leads to revenge, as highlighted by the Mwangi (2008) case study, but also in the discussion of David Eaton (2008, p. 106) who highlights the fact that many raids are "an obscure livestock theft" which is, however, followed by "asymmetrical retaliation" (Ibid, p. 109).

[138] This explanation sometimes underscores the political dimension (see Schilling, Opiyo & Scheffran, 2012) even though it is not the case of all studies (Butler & Gates, 2012).

[139] Interestingly, David Eaton (2008, 2008a) shows how the focus on "root causes" leads to the situation of NGO "peace business" that is far from successful in the attempts to secure the peaceful end of disputes.

It is obviously questionable why the thefts occurred.[140] Climate change explanation that focuses on the scarcity argument that raids are one of the possible adaptation strategies to replenish lost animals due to droughts (Schilling et al., 2014, p. 250–251; Hendrickson, Armon & Mearns, 1998, p. 8)[141] does not seem plausible as this is in direct contradiction to the situation that most raiding happens at times of relative abundance (Witsenburg & Adano, 2009; Adano et al., 2012; Eaton, 2008). Indeed, the simple environmental or climatic explanation falls short and needs to be used together with political (local but also international) conditions. Historically, for example, Turkana and Pokot had diverse forms of adaptability to environmental stress and weather fluctuations as mutual cooperation was a possible solution, however, the introduction of different law arrangements and land and regional arrangements changed this (Lind, 2003, pp. 326–328).[142] Similarly, *majimboism* and the added ethnic discourse changed the political landscape of raiding in modern times (Eriksen & Lind, 2009, p. 831). Last but not least, the recently introduced devolution seems to have similar impacts as it brings another political competition that again influences the relations of pastoral communities (Lind, 2018).

Furthermore, the relationship between various groups changed even more with the introduction of commercialisation (Buchanan-Smith & Lind, 2005, p. 7; Mwangi, 2008, p. 84). The raiding now became a business sometimes with the involvement of politicians (Buchanan-Smith & Lind, 2005, p. 7). Some authors even differentiate between "redistributive raiding" and "predatory raiding" where the second is connected to business or "a criminal logic" (Hendrickson, Armon & Mearns, 1998, pp. 8–9).

Overall, raiding and pastoralist conflicts have many dimensions; however, it is clear that the political one is very important, and it is partially connected to the same root as the above-mentioned electoral violence. It is connected to politicisation and the nature of

[140] According to Eaton (2008, p. 106), the reasons behind the theft are "not always significant" however we can argue that even though raiding could be part of ordinary crime, it is important to know why the group decided to do it.

[141] Interestingly, Schilling, Opiyo and Scheffran (2012) point to the fact that in the case of the Turkana Pokot conflict, each of the groups had different reasons for raiding. While in the case of Turkana, it is rather on the side of resource scarcity. In the case of Pokot, it is rather greed and a dowry.

[142] Danny de Vries, Paul Leslie and Terrence McCabe (2006) show different ways of herds acquisition dynamics to secure resource security during hard times.

political competition that changed the nature of raiding (Greiner, 2013). With the introduction of the commercialisation of raiding, this led to a separation from traditional authorities as mentioned above.

To sum up, it is clear that the path that combines access to water, urbanisation, and inequality works only partially and with the acceptance of other conditions. In the case of political power inequality and marginalisation, it is rather a discursive notion introduced by politicians that reflects politics in a win-lose situation when one who loses will be marginalised. Through this discourse even wrapped in ethnically perceived marginalisation, the fear of possible marginalisation or marginalisation due to lost political competition could be part of the explanation. However, this situation happened only due to the politicisation of access to land and ethnicity and expected marginalisation due to the loss of elections or devolution. Hence, it seems that it is rather not marginalisation *per se* but an institutional setting that leads to the "winner-takes-all politics", i.e. marginalisation. Although, part of the electoral violence appeared in urban areas, the urbanisation was not part of the explanation, neither of electoral violence nor raiding and pastoral conflicts. Last but not least, good access to water could be partially an explanation as it would go well with the resource abundance argument that raiding appears in times of plenitude. This would even go well with the politicisation and fear of marginalisation which influenced it in modern times and after the 1990s when inter-communal conflicts became a part of national politics. However, this condition could be accepted carefully, as it is a question of whether the resource curse of water is clearly at the heart of causes or is rather contextual to Kenya or a simple coincidence mainly due to the introduction of factors like commercialisation raiding in modern times. Last but not least, it is also questionable how precise the operationalisation through access to basic drinking water services is as this does not have to precisely define what herder communities look for. Therefore, it would be overestimation to accept the role of water abundance.

7.3.3 Brief conclusion

To sum up the reasons why some countries vulnerable to climate change in Africa face violent inter-communal conflicts, it seems that QCA results (LAN*WAT*~EQL +WAT*URB*~EQL) should be modified. In both cases, marginalisation appeared to be

an important factor, even though we have to add that in both cases it is important due to its politicisation. In the case of Sudan, marginalisation was heavily politicised through the central government that manipulated various ethnic groups in Sudan in the way of "divide and rule". Even though Sudan would have, compared to other countries in the QCA, a rather higher amount of land per capita, the failure of the land tenure system and the marginalisation of some groups in the access to land and other resources is important. Furthermore, it is important to highlight the politicisation of the central government that created an environment which instrumentally and deliberately pitted ethnic groups against each other to secure its own goals. In this political environment, unequal access to resources, particularly land, is a significant space for conflictual mobilisation.

A similar situation could be also seen in Kenya. Same as in the case of Sudan, political manipulation and politicisation of access to land led to violent inter-communal conflicts. Marginalisation was used here in the political fight by political elites. In this case, land access was important also throughout the history of the country; however, this topic was later politicised around ethnic boundaries with the politics of *majimboism*. In a political environment that was understand as "winner-takes-all", expected marginalisation in case of a lost election was easily manipulated into inter-communal violence that was organised by political elites. This political manipulation also reached inter-communal violence connected with the raiding. However, we have to decline the part of the solution that connects urbanisation and access to water. Even though some authors argue that raiding happens in times of good access to resources (Witsenburg & Adano, 2009), this is hardly applicable in the way this condition has been operationalised and therefore it seems like a coincidence.

In the end, we can suggest that it is important to modify the solution for violent inter-communal conflicts. While it could be claimed that marginalisation is still an important part of the solution, another major condition is the elite manipulation of land access, land tenure systems and ethnic boundaries and grievances. Therefore, access to resources like water and land is not important per se and in the way of an absolute amount per capita but in the way it is, or it is expected that it will be, redistributed among social groups by political elites. These resources, therefore, matter as a part of the political fight, both as a reward or lost access to them after, for example, elections or in the process of a political game that the regime plays to sustain its power.

Conclusion

While climate change is today one of the most discussed topics around the world, its influence on conflicts seems to be rather minor (Mach et. al., 2019, p. 196). This dissertation, however, did not focus on the direct influence of climate change. Rather its main focus was to discuss various causes, conditions and mechanisms under which vulnerability to climate change among African countries transforms to a rather higher incidence of conflicts. Obviously, climate change partially influences the possibility of conflict incidence however, it is only background for it. It makes countries vulnerable, however, this does not mean that it automatically causes conflicts. Conflicts in such climatically influenced, or vulnerable countries are rather results of different conditions. Therefore, while in this thesis it is accepted that climate change makes countries vulnerable to potential conflicts, climate change vulnerability does not necessarily lead to a plethora of conflicts.

The goal of this dissertation is composed of the four main questions. The first two are focused more on climate change and vulnerability and the other two on conditions in which this vulnerability changes into a high incidence of conflicts, both violent inter-communal and civil.

The first goal and question aimed at the various manifestations of climate change in Africa. It is obvious that Africa faces a heavy impact of climate change. Even though there are small inter-regional differences it could be concluded on the basis of current literature and also the available data that the temperature is rising. This situation is not as unambiguous in the case of precipitation. In this case, African regions manifest great differences as some regions differ historically, and in projections as well. However, this depends on the approach different studies use, hence, in this case we also have to look at different patterns of precipitation (cf. Serdeczny et al., 2017; Shongwe et al., 2009; Vizy & Cook, 2012; Sylla et al. 2016; Han, Cook & Vizy, 2019). This is even manifested in different regions of countries as is clear from the newest data of the Climate Change Knowledge Portal (World Bank Group, 2023).

In summary, climate change directly or indirectly influences the economy, health and the lives of people. It affects agriculture and through various mechanisms also food production. This has a further impact on the over-all economy and levels of poverty.

However, it also influences the migration patterns as people must migrate to find new places to work (see Chapter 1). One of the most interesting influences and probably most unpredictable one is a change in health as it seems that climate change will also influence the occurrence of various diseases, like malaria and other vector-borne diseases (cf. Parham & Michael, 2010; Ermert et al., 2012). This could have a further unpredictable influence on the levels of poverty but also agriculture. To sum up the climate change influence on society on multiple levels, the influence is and will be far-reaching.

The second goal focused on climate-change vulnerable countries. In this regard, this dissertation is inspired by the works of Environmental Security (e.g., Homer-Dixon, 1999; Kahl, 2006) and previous research on climate-conflict vulnerability (e.g., Busby, 2012, 2013, 2014; Raleigh, Jordan & Salehyan, 2008; Wheeler, 2011). Through three sets of vulnerability, climate-population, climate-economic, climate-political, this thesis finds 12 countries vulnerable to climate change (for a whole overview see chapter 4.1). Interestingly, some countries appeared in more than one set. In some cases, the countries that are seen as vulnerable to climate change partially overlapped with previous studies. This should not be surprising as this rather validates the results of the first part of this dissertation. While some countries were obvious examples of vulnerability due to their economic or political weakness, e.g., Somalia or Sudan, others showed vulnerability based rather on density, e.g., Nigeria. While the climate change influence is clear over all countries in Africa, as clear from Chapter 1, it was still rather surprising that countries that are the most vulnerable countries according to the analysis in this dissertation appeared in each region of Africa. This is surprising as often some regions are more likely highlighted as climate change hotspots, mainly in the media or public discourse while others seem to be forgotten. Interestingly, Eastern Africa still seems to have the strongest representation among the sample. While from Chapter 1 it is clear that there are inter-regional differences in the manifestation of climate change, particularly in the case of precipitation, the list of countries captures the diversity of countries in climate change vulnerability.

While the first two goals were rather minor, the other two focus on conditions that transform climate change vulnerability into conflicts, precisely speaking what conditions lead to rather a high incidence of violent conflicts. First, clearly, conflicts in countries vulnerable to climate change are contextual and historically conditioned. One should

never choose a simplified or tempting explanation that seems to fit all cases. While a quantitative inquiry is important, it should always be followed by a contextual discussion of various cases. This is also the case of this dissertation. While the QCA offers an important tool for research of conflicts, in this case solutions heavily depended on data that could be possibly biased or skewed. Also, as the main focus is on the most vulnerable countries, this leads to a situation of a very limited choice of cases that in the end influence the number of possibly used variables. This was clearly visible mainly in the discussion of violent inter-communal conflicts as the cases discussed aptly proved that some solution combinations do not make sense in a closer examination. While they also pointed to other important conditions and mechanisms in which conditions from the QCA could be interpreted.

The second, as mentioned in the first point, is that the choice of conditions was limited due to the character of the QCA and mainly due to the ratio between the variables and the number of cases. However, the choice was based on current theoretical knowledge that is very broad in this case. Even though, after the discussion of cases it is questionable mainly for future research how and in what way to include variables that focus on land tenure systems, modernisation and the way land appropriation changed through history as mainly in the case of violent inter-communal conflicts, this seemed to be important in the same way as the divide and rule strategy accepted by regimes.

The third, it also seems to be clear that while in this research inter-communal and violent civil conflicts have been examined separately in the QCA, they could mutually intersect. This was clearly visible in the case of Sudan and also in the case of Nigeria where label of "terrorism" is used against Fulani and it is part of inter-communal conflicts (Schmiedl, 2023; Moritz & Mbacke, 2022). However, this does not have to be the rule as a country could suffer from an inter-communal violent conflict but be spared from violent civil conflicts.

In the case of violent civil conflicts, it seems that a combination of bad access to land, marginalisation and regime instability or dependence on oil present problematic settings for climate change vulnerable countries. The role of marginalisation and inequality appears to be a necessary condition. In the case of access to land, even though we can find support for the role of land degradation, it looks, at least in the case of

Somalia, that it is also important to understand the importance of the land tenure system as historical changes of legislature destroyed the possibilities of land appropriation that led to grievances. In case of Nigeria, the land degradation is also significant in case of the area around Lake Chad where it influences livelihood. However, this has to be understood together with the previously mentioned marginalisation and also with the malfunction of state institutions. In the case of Nigeria, it is the corruption of an oil dependent country while in the case of Somalia, historically it was mismanagement of the regime of Siad Barre and the instability of the current regime that started but also sustained violence. This could be supported also by results of analyses of what leads to a rather lower incidence of violent civil conflicts. This is caused by a rather strong stable regime or in a situation when states are not heavily dependent on oil with rather lower marginalisation.[143]

In the case of violent inter-communal conflicts, there was a need for modifications in the results of the QCA. After a discussion of the two cases, the influence of rather good access to water and land, and high rates of urbanisation was declined. Instead of that, it is political manipulation and a divide and rule strategy, the politicisation of land and marginalisation as conditions that cause a rather high incidence of violent inter-communal conflicts. In both cases, the political manipulation in case of land appropriation was more than important. In such a situation when land and associated identity become part of the political game, conflicts are provoked. In one case, this was part of the divide and rule strategy in the second, part of the electoral strategy.

This leads us to a question of the quality of data, particularly economic data. It is questionable how useful the measurement of access to land and water is through material means as it seems clear that policies and the way politicians and elites use land and water issues as strategic are more important and therefore should be further investigated, instead of a particular focus on the amount of soil or water per capita. However, this is also linked to the biggest new avenue of research that is ahead of us, which is the issue of localised influences of climate change. This is particularly connected with a more localised understanding of vulnerability and obviously also conflicts. While we often use state-

[143] This does not mean that the society is equal in the case of access to power, however, they represent lower rates of marginalisation from cases in QCA.

level data, the impacts and influences are local. Therefore, we face the issues with a connection between these local impacts and data that are often on different levels. Even though the recent evolution in conflict research is able to disaggregate the data, it seems to be more plausible to rather come back into field research and explore various situations and reactions of local communities through ethnography. While there is also distinct advancement in the case of quantitative studies (for an overview see, e.g. Ide, 2017; Koubi, 2019) it is still important, particularly in case of Africa, to employ strong field research mainly in the case of inter-communal conflicts and the way they are influenced by changing climate and environment.

Furthermore, in the case of the future research of climate and environmental change-conflicts nexus, we need to heavily focus on an institutional and structural factors and global political economy. Inequality, land tenure systems but also modernisation and implementation of land reforms that are in conflict with traditional systems are important in the same way as the focus on institutional stability and transparency. In case of interaction between equal power access and regime stability we can question how this is connected with level of democracy and conflicts. However, this does not mean that we should necessarily refuse the theoretical basis of Environmental Security as it clearly includes these factors in analyses (Homer-Dixon, 1999; Homer-Dixon & Blitt, 1998; Kahl, 2006). However, social and political factors are what we need to focus on rather than on alarmist environmental determinism that sometimes appear in the public space and historically received a great amount of attention (e.g., Kaplan, 1994). In this regard, there should be more inter-theoretical cooperation as highlighted by a recent study by Ide et al. (2023).

Particularly interesting is also the question that focuses on the other side of the same coin. The conditions that prohibit escalation and lead to a lower or no incidence of conflicts are an important research avenue for future. In this regard, even though it was not the goal either of the research question or this dissertation, the mutual interplay of equality, regime stability, access to land and the absence of the corrupting environment of oil dependence (~REG*LAN + ~OIL*~REG*EQL + ~OIL*LAN*EQL→ ~CW) seem interesting in the case of rather low incidence of violent civil conflicts (see chapter 6.1). In the case of inter-communal conflicts, we could highlight the rather lower rates of growth of the urban population and group equal access to power

(~WAT*~URB+~LAN*~URB+~WAT*EQL (see chapter 6.2). However, as mentioned above in this case, mainly data on land and water seem to be too problematic to make any further conclusions about the low incidence of conflicts, while it seems to be rather important to check land tenure and water access policies. However, this topic needs a further and deeper investigation.

Finally, with growing instability mainly in the Sahel and a further involvement of new actors in Africa, particularly Russia, it will be interesting to see how military regimes like in Mali will be able to deal with the growing influence of environmental and climate change. While for now the climate influence on conflicts is rather small, this does not have to be the case in the future and therefore, it could even be more acute to solve the institutional and structural problems of African states.

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Appendix

Appendix 1 Fuzzy-set Membership and Full Solutions

CAS	CW	COM	OIL	REG	LAN	WAT	URB	EQL
Burundi	0.55	0.22	0.26	0.87	0.22	0.78	0.35	0.19
Ethiopia	0.57	0.40	0.26	0.35	0.27	0.06	0.46	0.02
Chad	0.26	0.24	0.99	0.24	0.68	0.22	0.11	0.01
Malawi	0.22	0.22	0.26	0.24	0.41	0.89	0.16	0.45
Mozambique	0.22	0.22	0.27	0.24	0.38	0.15	0.54	0.60
Niger	0.24	0.23	0.33	0.59	0.99	0.33	0.07	0.77
Somalia	1.00	0.99	0.26	1.00	0.19	0.14	0.91	0.09
Sudan	0.68	0.78	0.88	0.35	0.86	0.61	0.14	0.01
Kenya	0.26	0.66	0.26	0.35	0.24	0.71	0.59	0.29
Lesotho	0.22	0.22	0.26	0.24	0.26	0.96	0.75	0.97
Nigeria	0.55	0.88	0.94	0.35	0.39	0.87	0.98	0.41
Uganda	0.53	0.29	0.26	0.35	0.35	0.16	0.76	0.10

(Author)

Appendix 2 Complete Solutions - CW

COMPLEX SOLUTION- CW				
frequency cutoff:	1			
consistency cutoff:	0.901235			
	raw coverage	unique coverage	consistency	Cases in term
~OIL*REG*~LAN*~EQL	0.550943	0.550943	0.901235	Somalia (0.74,1), Burundi (0.74,0.55)
solution coverage:	0.550943			
solution consistency	0.901235			
PARSIMONIOUS SOLUTION- CW				
frequency cutoff:	1			
consistency cutoff:	0.901235			

	raw coverage	unique coverage	consistency	Cases in term
REG*~LAN	0.701887	0.701887	0.907317	Somalia (0.81,1), Burundi (0.78,0.55)
solution coverage:	0.701887			
solution consistency	0.907317			
COMPLEX SOLUTION - ~CW				
frequency cutoff:	1			
consistency cutoff:	0.902941			
	raw coverage	unique coverage	consistency	Cases in term
~OIL*~REG*~LAN*EQL	0.361194	0.159701	1	Lesotho (0.74,0.78), Mozambique (0.6,0.78)
OIL*~REG*LAN*~EQL	0.458209	0.255224	0.902941	Chad (0.68,0.74), Sudan (0.65,0.32)
~OIL*REG*LAN*EQL	0.289552	0.0626866	0.955665	Niger (0.59,0.76)
solution coverage:	0.71194			
consistency:	0.919075			
PARSIMONIOUS SOLUTION - ~CW				
frequency cutoff:	1			
consistency cutoff:	0.902941			
	raw coverage	unique coverage	consistency	Cases in term
EQL	0.540299	0.126866	0.925831	Lesotho (0.97,0.78), Niger (0.77,0.76), Mozambique (0.6,0.78)
LAN	0.638806	0.225373	0.816794	Niger (0.99,0.76), Sudan (0.86,0.32),

				Chad (0.68,0.74)
solution coverage:	0.765672			
consistency:	0.816879			

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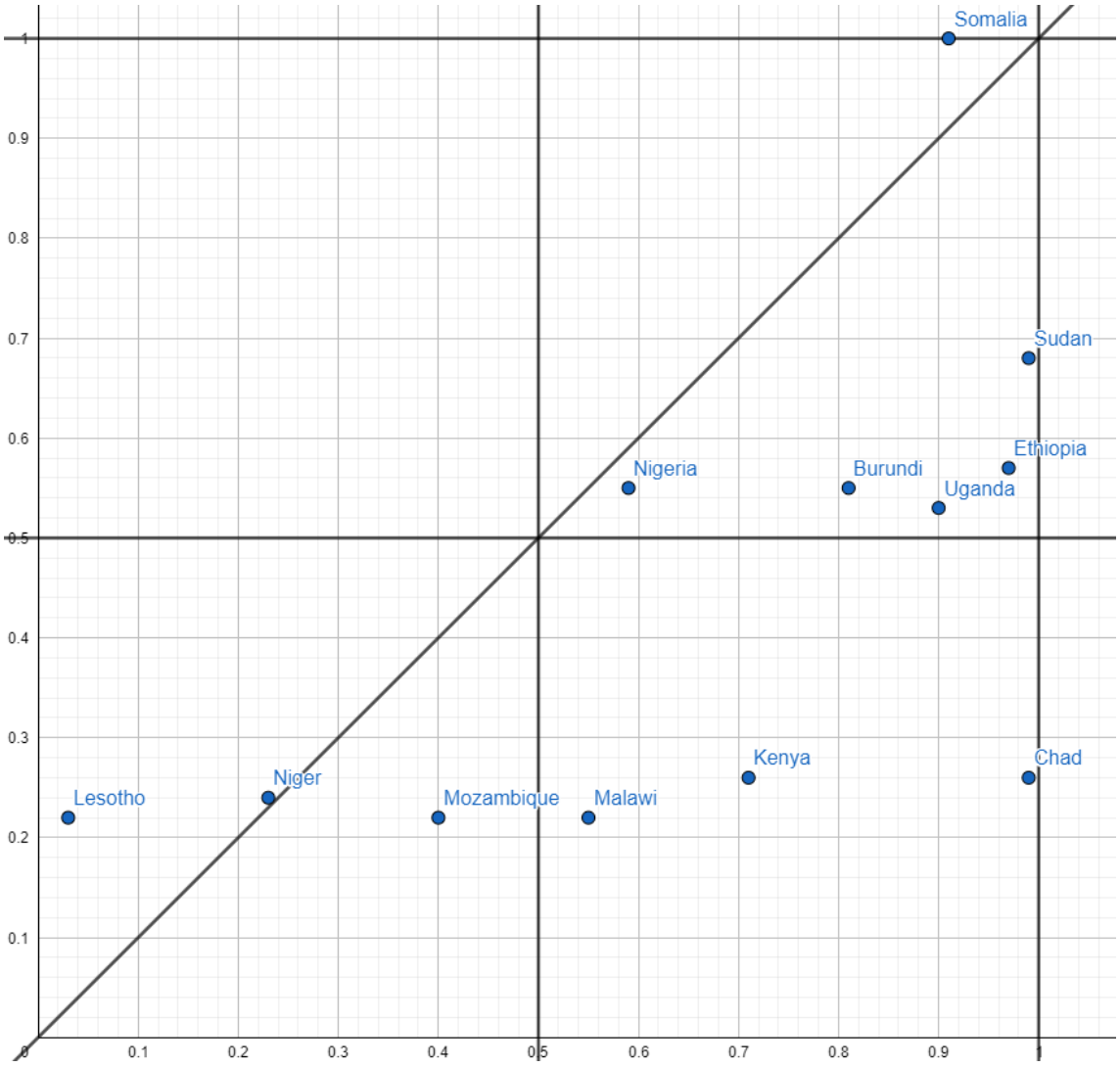
Appendix 3 Complete Solutions - COM

COMPLEX SOLUTION - COM				
frequency cutoff:	1			
consistency cutoff	0.922131			
	raw coverage	unique coverage	consistency	Cases in term
LAN*WAT*~URB*~EQL	0.420561	0.160748	0.922131	Sudan (0.61,0.78)
~LAN*WAT*URB*~EQL K	0.441121	0.181308	0.947791	Nigeria (0.59,0.88), Kenya (0.59,0.66)
solution coverage:	0.601869			
solution consistency:	0.909604			
PARSIMONIOUS SOLUTION- COM				
frequency cutoff:	1			
consistency cutoff:	0.901235			
	raw coverage	unique coverage	consistency	Cases in term
LAN*WAT	0.534579	0.185047	0.896552	Nigeria (0.59,0.88), Kenya (0.59,0.66)
WAT*URB*~EQL	0.452336	0.102804	0.94902	
solution coverage:	0.637383			
solution consistency	0.881137			
COMPLEX SOLUTION - ~COM				
frequency cutoff:	1			
consistency cutoff	0.913793			
	raw coverage	unique coverage	consistency	Cases in term
~LAN*~URB*~EQL	0.488722	0.178947	0.955882	Burundi (0.65,0.78), Malawi (0.55,0.78), Ethiopia (0.54,0.6)

LAN*~WAT*~URB	0.466165	0.165413	0.925373	Chad (0.68,0.76), Niger (0.67,0.77)
~LAN*~WAT*URB*EQL	0.218045	0.0360901	0.941558	Mozambique (0.54,0.78)
solution coverage:	0.601869			
solution consistency:	0.909604			
PARSIMONIOUS SOLUTION- ~COM				
frequency cutoff:	1			
consistency cutoff:	0.913793			
	raw coverage	unique coverage	consistency	Cases in term
~LAN*~URB	0.536842	0.216541	0.959677	Burundi (0.65,0.78), Malawi (0.59,0.78), Ethiopia (0.54,0.6)
~WAT*EQL	0.326316	0.0210527	0.960177	Niger (0.67,0.77), Mozambique (0.6,0.78)
LAN*~WAT	0.497744	0.0827069	0.901907	Chad (0.68,0.76), Niger (0.67,0.77)
solution coverage:	0.754887			
solution consistency	0.921101			

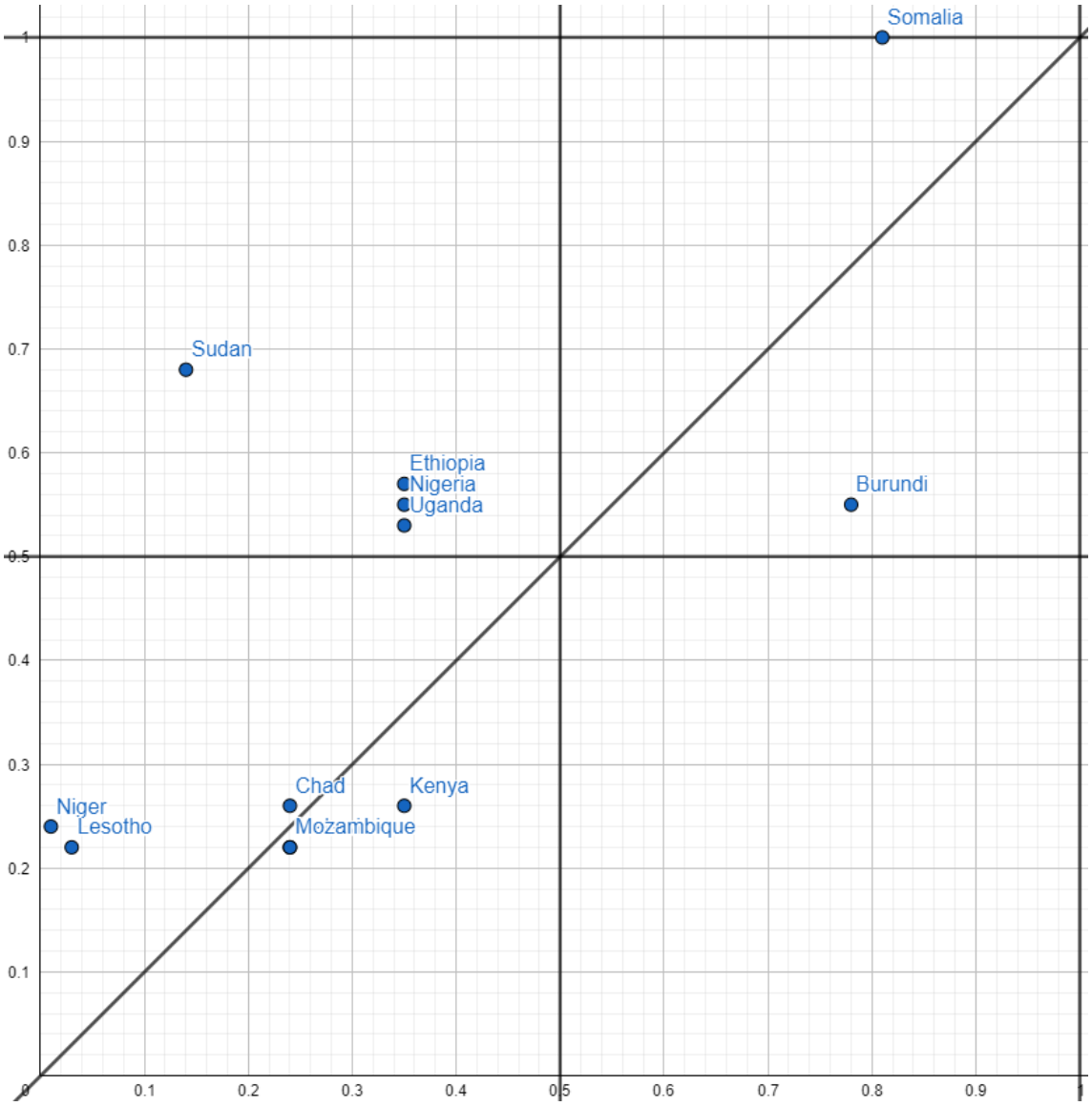
(Author)

Appendix 4 Distribution of Cases in Necessarry Condition ~EQL



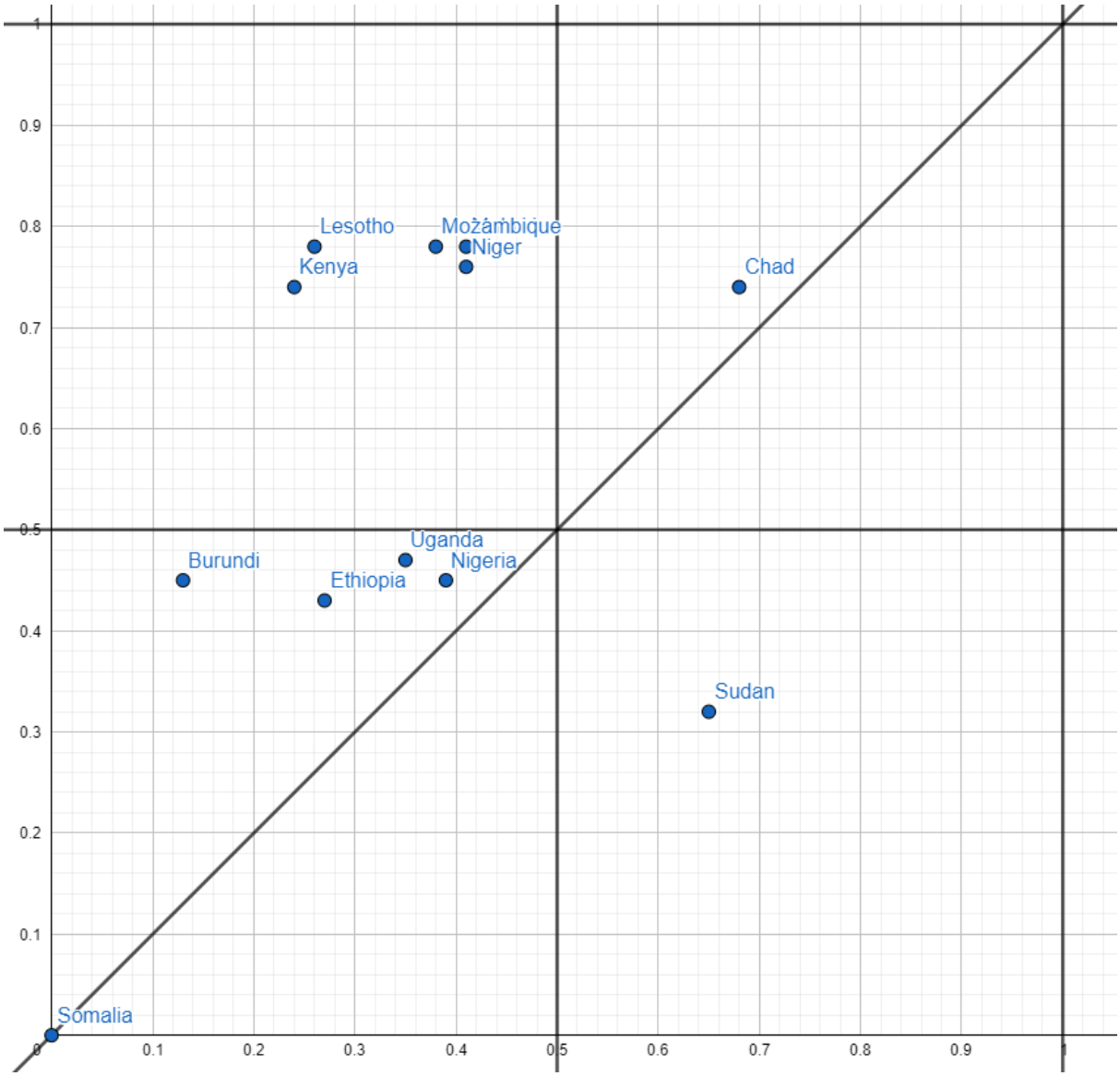
(Author)

Appendix 5 Distribution of Cases REG~LAN*~EQL →CW*



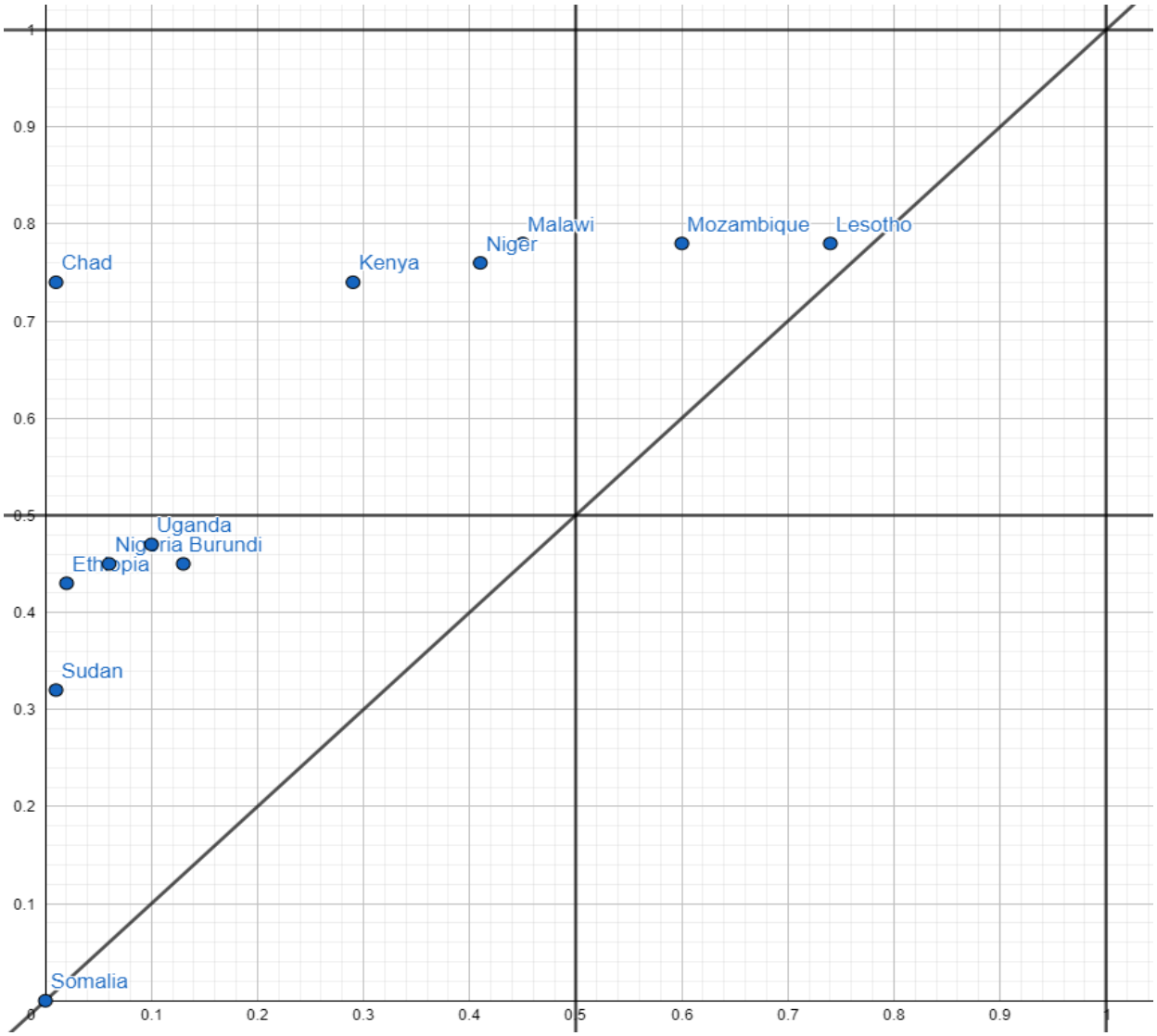
(Author)

*Appendix 6 Distribution of Cases - ~REG*LAN →~CW*



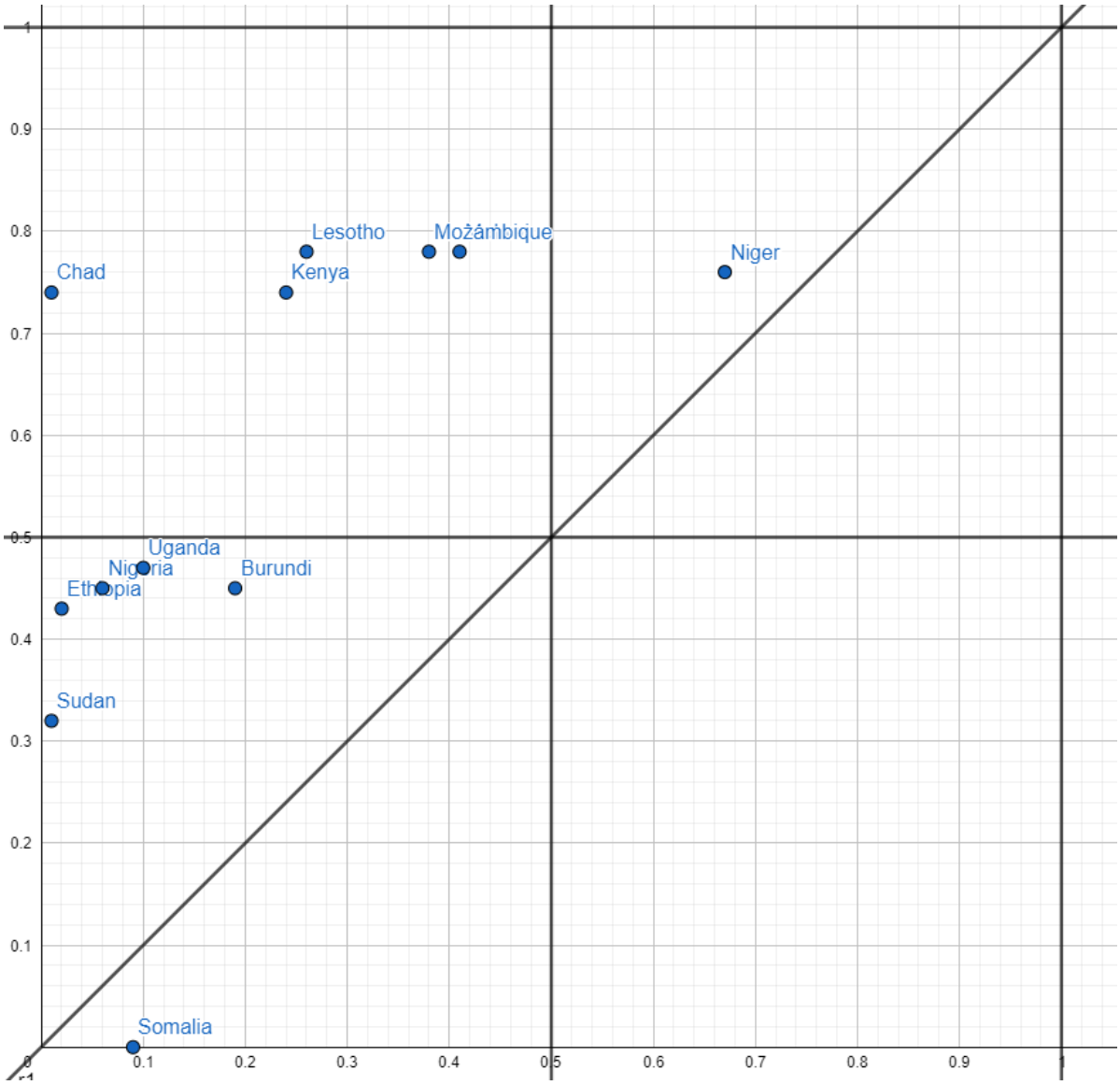
(Author)

Appendix 7 Distribution of Cases - ~OIL~REG*EQL →~CW*



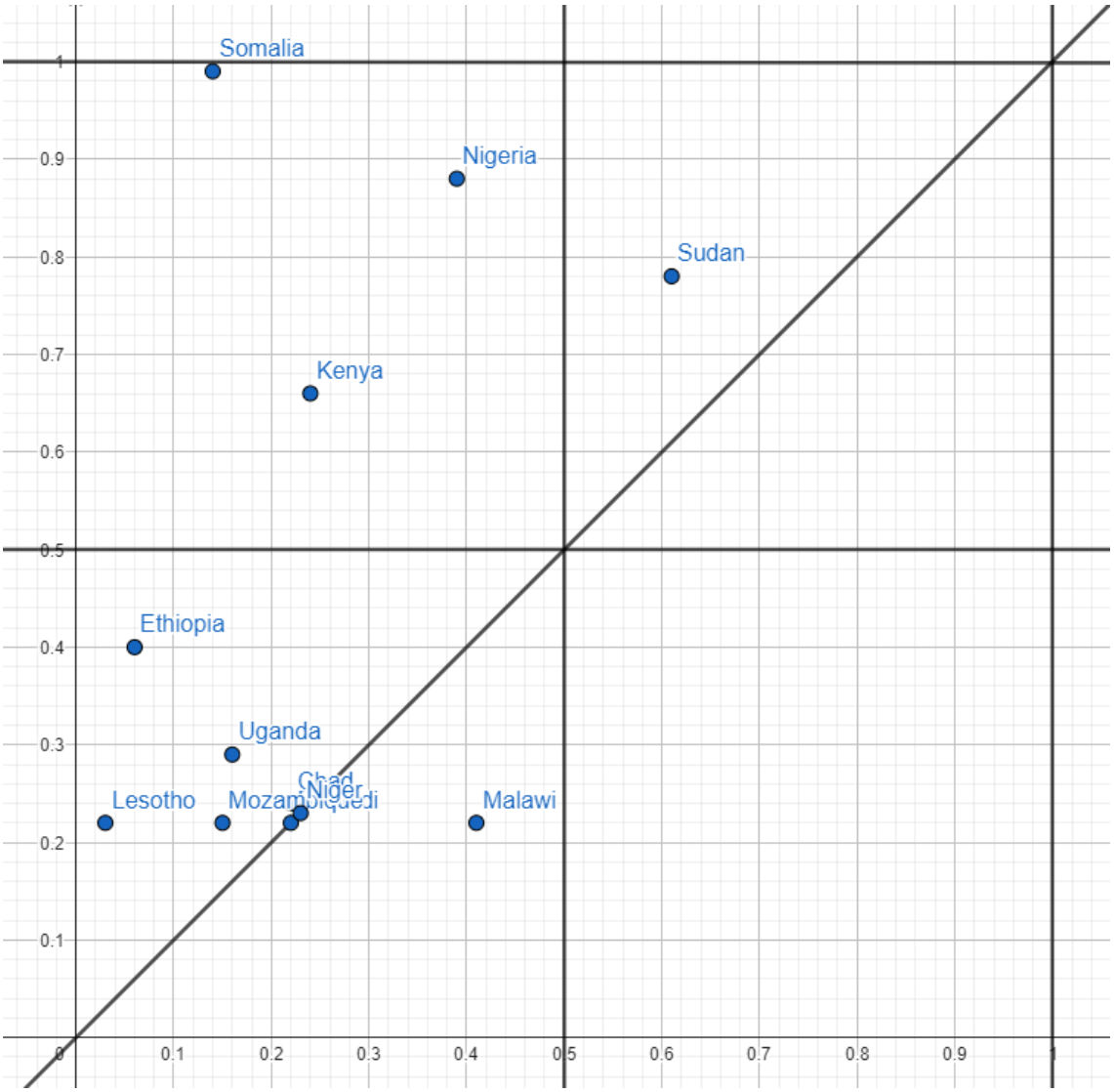
(Author)

*Appendix 8 Distribution of Cases - ~OIL*LAN*EQL →~CW*

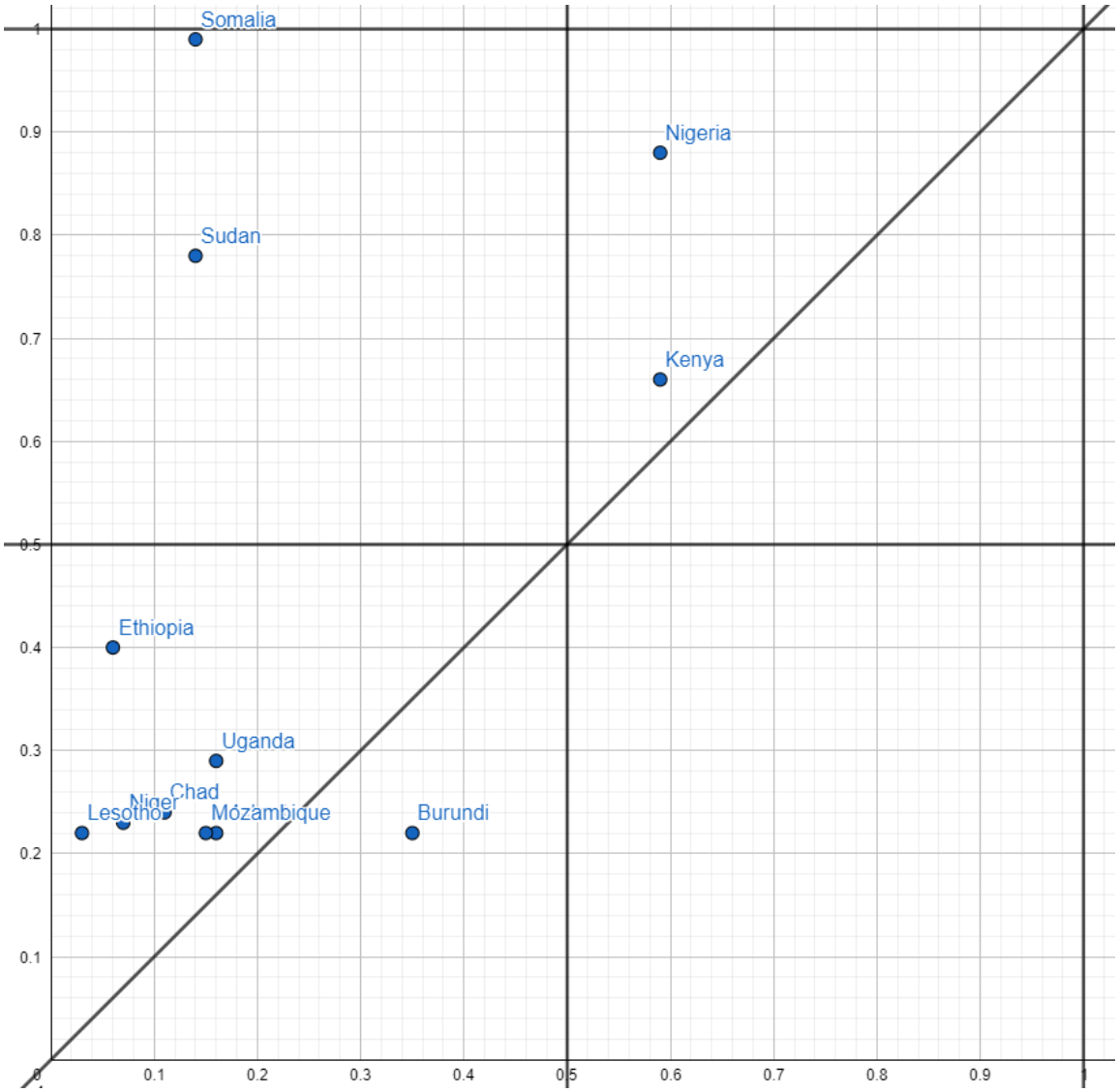


(Author)

*Appendix 9 Distribution of Cases - LAN*WAT*~EQL→COM*

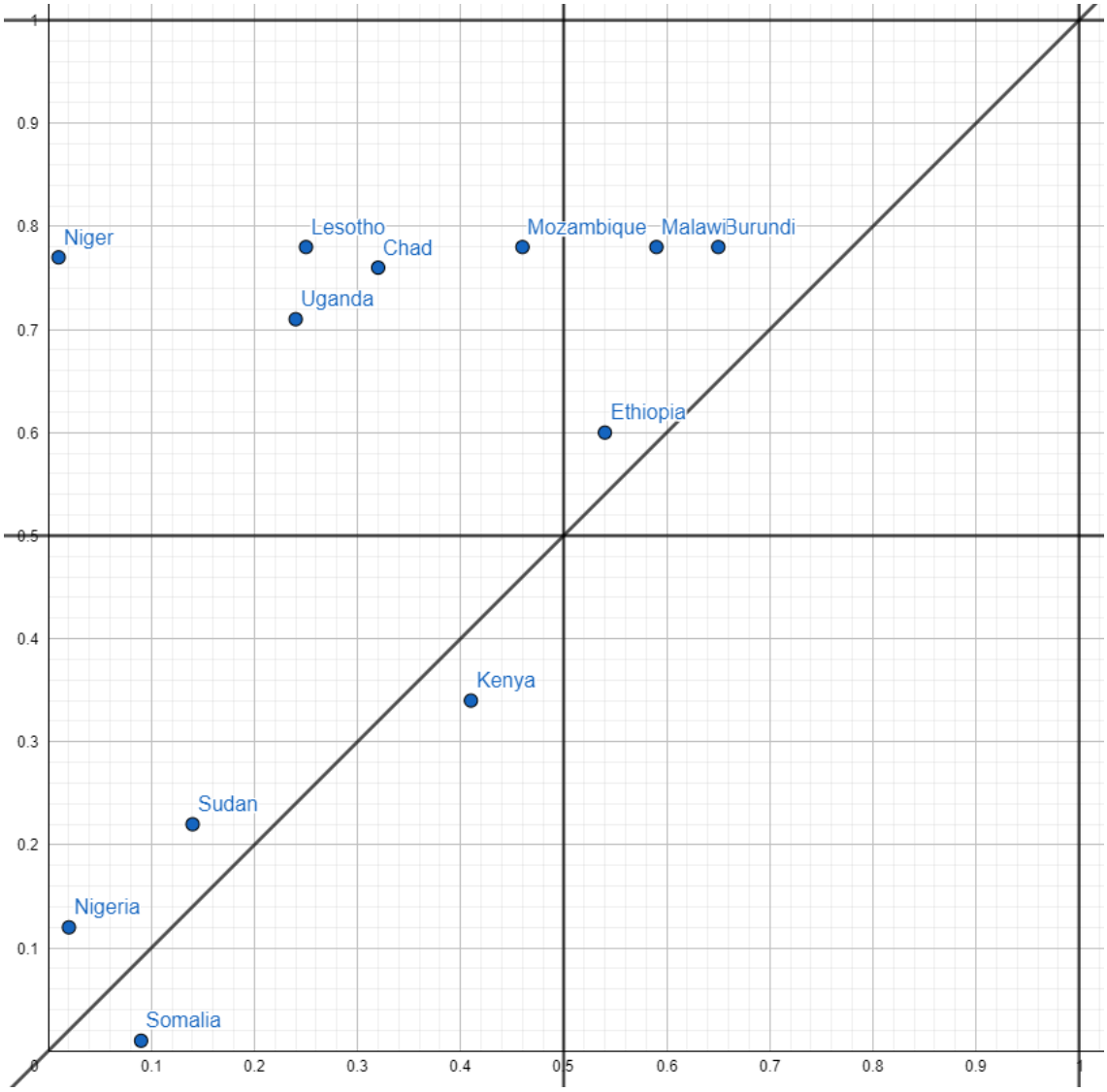


*Appendix 10 Distribution of Cases - WAT*URB*~EQL→COM*



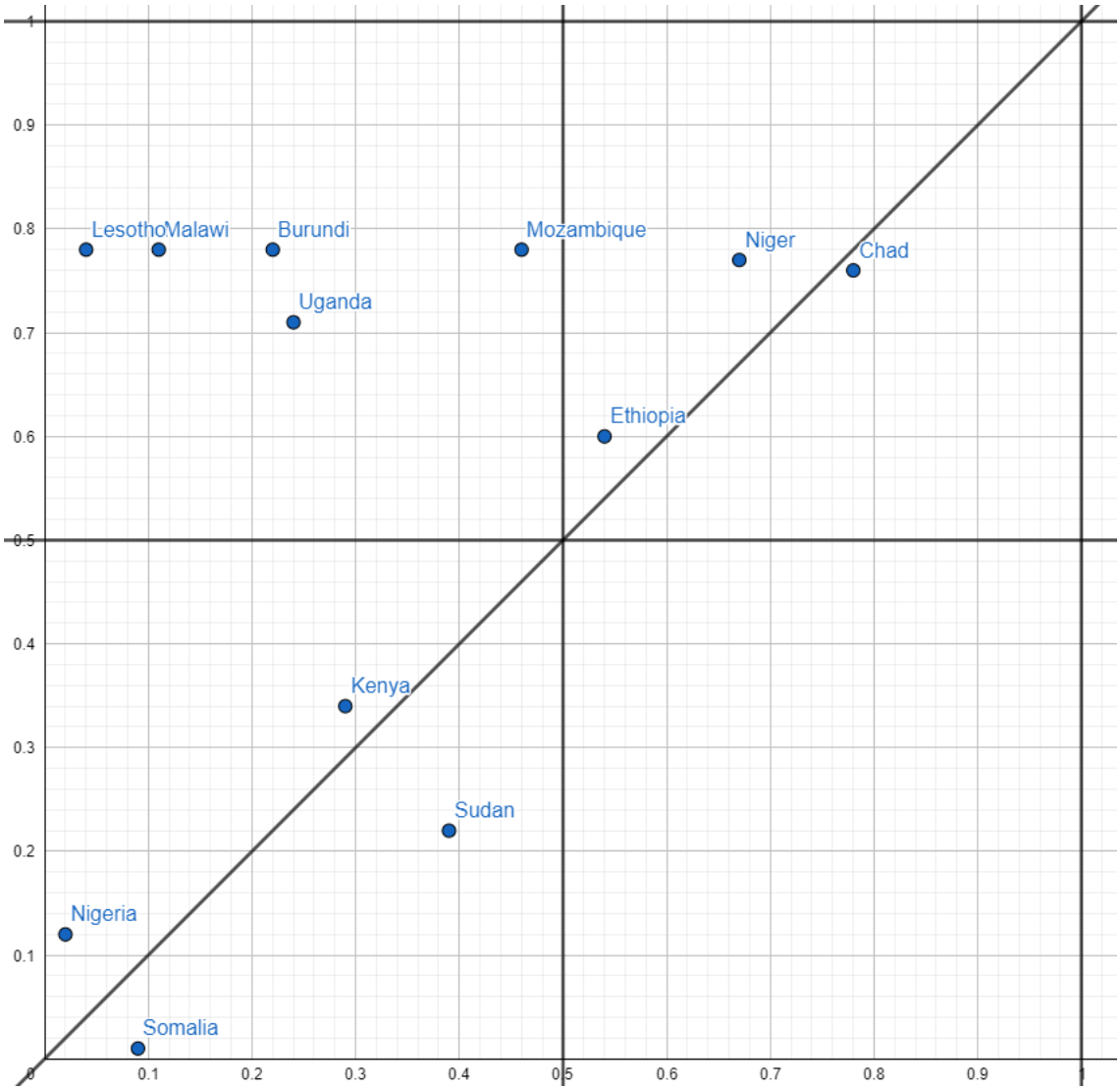
(Author)

Appendix 11 Distribution of Cases ~LAN~URB →~COM*



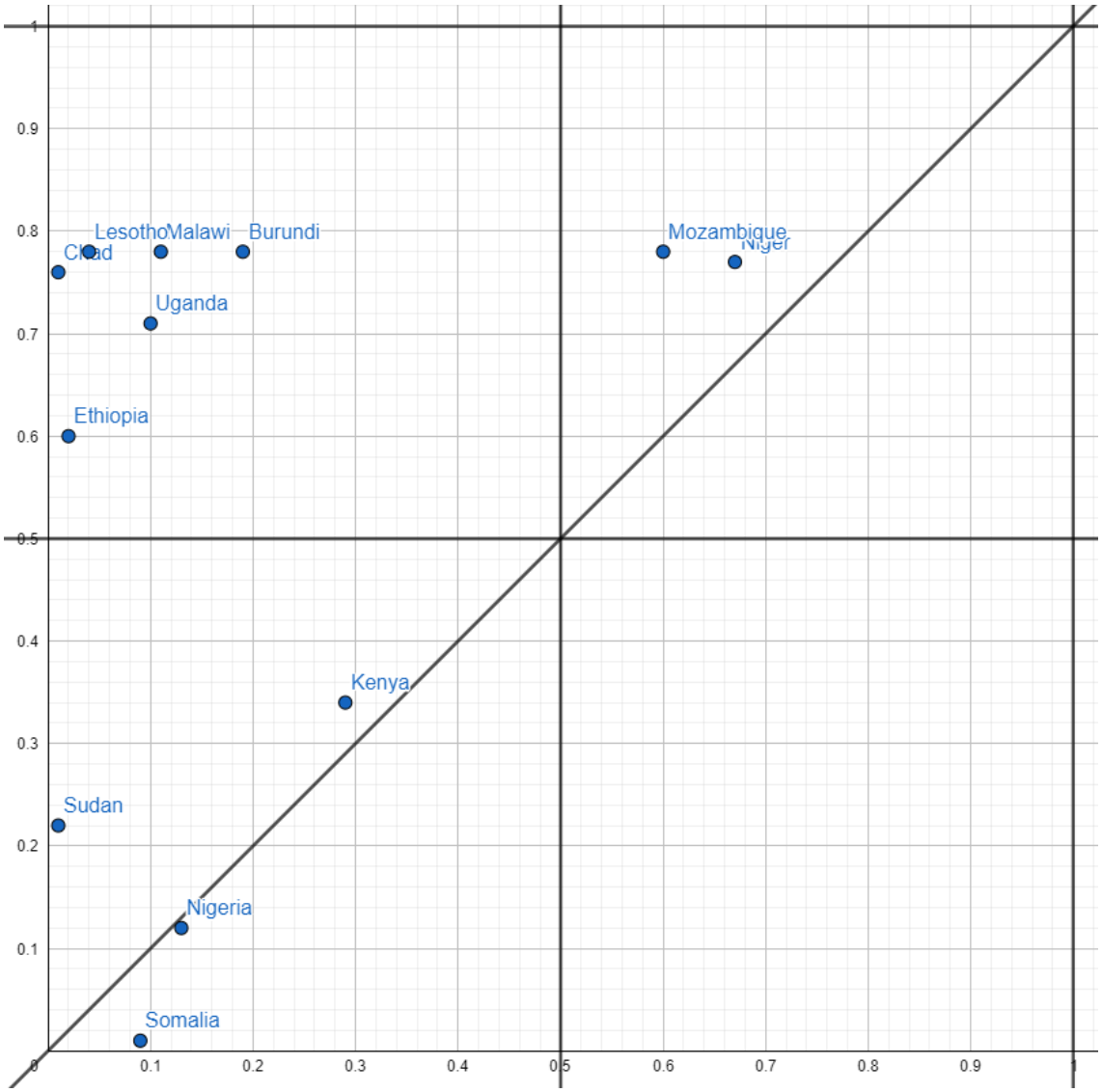
(Author)

Appendix 12 Distribution of Cases ~WAT~URB →~COM*



(Author)

Appendix 13 Distribution of Cases ~WAT~EQL →~COM*



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