Wrangling When the Wells Run Dry

A Qualitative Comparative Analysis of drought-induced political unrest in sub-Saharan Africa

Rick ten Holder
s1010199

Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master in Political Science (MSc)
Master's specialization in Conflict, Power and Politics

Supervisor: Dr. D.J. DeRock

Nijmegen School of Management
Radboud University, Nijmegen
Academic year 2021-2022

23-06-2022

Word count: 16196

Radboud Universiteit

Summary

As extreme weather is likely to increase due to accelerated climate change, scholars and policy makers alike are progressively worried about its security implications. My thesis contributes to this debate by analyzing the context in which droughts can lead to political unrest in sub-Saharan Africa. Political unrest is of theoretical interest, because it can be an indicator for underlying grievances, it has the ability to challenge existing political power structures and can be driver of change, and it can be a starting point for armed, violent conflicts. Despite this, however, political unrest is still understudied in environment security research. I use a Qualitative Comparative Analysis (QCA) to integrate qualitative and quantitative data on different measurement levels for a sample of 37 cases (11 of which experienced political unrest). My findings show that the onset of drought-induced political unrest is highly dependent on a combination of specific contextual factors. This indicates that disaster-conflict links are far from deterministic.

Table of contents

List of abbreviations and acronyms

ACLED	Armed Conflict Location and Event Dataset
BTI	Bertelsmann Transformation Index Project
COVID-19	Coronavirus disease 2019
csQCA	Crisp-set Qualitative Comparative Analysis
EM-DAT	Emergency Events Database
EPR	Ethnic Power Relations Core Dataset
GIEWS	Global Information and Early Warning System
FAO	Food and Agriculture Organization of the United Nations
fsQCA	Fuzzy-set Qualitative Comparative Analysis
IMR	Infant Mortality Rate
INUS	insufficient, but necessary part of an unnecessary but sufficient condition
mvQCA	Multi-value Qualitative Comparative Analysis
NGO	Non-governmental organization
QCA	Qualitative Comparative Analysis
SPEI	Standardized Precipitation-Evapotranspiration Index
UCDP	Uppsala Conflict Data Program
UN	United Nations
WID	World Inequality Database

List of tables and figures

1. Introduction

Over the coming decades, global warming is likely to increase the occurrence of severe weather, with floods and droughts as extreme examples (De Juan & Hänze, 2021; Ide et al. 2020a). While the topic has been covered in research for more than two decades, only recently high-ranking decisionmakers have become increasingly concerned about the security implications of these meteorological events (Ide et al., 2020a). Sweden, for example, initiated the third United Nations Security Council debate on the implications of climate change in 2018 and Germany prioritized the link between climate and conflict as a topic for its non-permanent membership in the UN Security Council (Ide et al., 2020a).

For many years, the literature on the relation between climate and conflict has been characterized by controversies over the existence and strength of climate change-conflict links (Ide et al., 2020a; Ide et al, 2020b). Some researchers have found a statistically significant correlation between climate-related disasters and conflict, while others claim that climate-conflict links are unsupported by the gathered evidence and that researchers that do find these links have biases in their approach to the problem (Helman et al., 2020; Ide et al, 2020b). Droughts have been particularly well studied in this research area. These articles, however, tend to focus on hazards rather than disasters (i.e. a focus on unusually low rainfall rather than the societal impacts of such weather events) (Ide et al., 2020b). Both quantitative and qualitative studies provide evidence for and against the link between droughts and conflict (ibid.). Recent research indicates that disasters (not exclusively climate change induced disasters) increase the risk of armed conflict, but that this link is weak and highly depends on different scope conditions (Ide et al., 2020b).

There is one main caveat regarding climate-conflict literature: with some exceptions (e.g. Ide et al., 2020a; Ide et al., 2020b; Raleigh et al., 2015), most scholars primarily focus on violent conflict rather than small-scale conflicts that involve little to no physical harm. These non-violent conflicts, however, can be of great theoretical interest. While it is true that non-violent conflicts tend to be less harmful in terms of human security and development when compared to armed conflict, they are still worth studying. Most notably, non-violent conflict can be a starting point for armed, violent conflicts. See for example the Syrian civil war: the conflict started in 2011 with protests against the Assad regime in 2011 that were generally peaceful, but were forcefully repressed, which ultimately led to a destructive full-fledged war (Ide et al., 2020b). But even beyond being a prelude for all-out war, non-violent conflicts can be an indicator for underlying grievances. Non-violent conflicts can act as a catalyst of these grievances and have the ability to challenge existing political power structures and can be drivers of change. The fact that non-violent conflicts have been understudied leads to a substantial theoretical blind spot.

In addition to this, the existing literature is generally focused on whether there is a relationship between droughts and conflict rather than in which contexts droughts affect the onset of conflict (see Burke et al., 2009; Fjelde & Von Uexkull, 2012; Helman et al., 2020; Linke & Ruether, 2021; Maystadt & Ecker, 2014; Raleigh et al., 2015; Van Weezel, 2019, 2020; Von Uexkull et al., 2016). This results in a limited understanding of what distinguishes situations where droughts have led to conflict from situations where conflict was averted (Mach et al., 2019). Moreover, researchers are not

quite sure what the mechanisms and mediators of the effects of climate on conflict are and how they interact with other conflict drivers (Mach et al., 2019). In this thesis, by contrast, the explicit goal is to map the combination(s) of conditions under which drought-related political unrest occurs. By doing so, this thesis helps to deepen our understanding of the complex causation between security and climate change. Knowing about these conditions allows the people in decision making positions of governments, international organizations and NGOs to understand when disasters can lead to conflict, which will give them the possibility to adjust their policy accordingly. The guiding research question in this thesis to help fill this gap in knowledge is as follows:

'Under what conditions can droughts lead to political unrest in sub-Saharan Africa?'

To determine which combinations of conditions lead to non-violent conflict, I employ a Qualitative Comparative Analysis (hereafter: QCA). QCA techniques allow for a systemic comparison of cases (Berg-Schlosser et al., 2012). QCA develops a conception of causality that is particularly suited to leave room for complexity. Put simply, different constellations of factors, or different "paths", might lead to the same result (ibid.). This is especially useful in this thesis, since I am interested in the different contexts in which drought related disasters lead to the onset of political unrest. Using QCA, I can determine which combinations of conditions tend to lead to unrest onset.

In this thesis I will specifically focus on sub-Saharan Africa, because countries in this region are often held to be particularly susceptible to political instability following climate change. This is largely due to their relatively weak institutional coping capacity, as most government revenue in the majority of Sub-Saharan countries largely depends on the agricultural sector, and irregular rainfall weakens the tax base and puts severe strains on public spending. (Fjelde & Von Uexkull, 2012, p. 445).

The main finding in this thesis is that drought-unrest links are not deterministic and instead are dependent on a complex configuration of situational factors. This is an interesting contribution to the existing 'environment security' research, because previous research mainly focuses on trying to establish deterministic causal links, for example whether there are favorable opportunity structures for conflict-engagement, if people are discriminated against when vital assets are distributed when a community is affected by a drought or whether state agencies are weakened because of a hazard-induced decline in economic productivity and are therefore less well-equipped to suppress protests and riots.

This thesis is structured as follows: in the following chapter, I will go into more detail about the theoretical foundations behind political unrest, its suggested influence on political unrest and the presumed conditions and contexts in which drought related disasters lead to political unrest. Following the literature review, I will use this chapter to determine what concepts are relevant for my thesis and how I will use them in my analysis. In chapter 3, I will explain the foundations of QCA, its benefits and its limitations. In addition to this, I will also substantiate the chosen datasets and how I have calibrated my data. This chapter will also include a brief introduction to the software that I have used in this thesis. Chapter 4 will consist of the analysis and the following results. Chapter 5 will be a discussion of the results. Chapter 6 will be a concluding chapter where I will discuss the implications of my findings.

2. Theoretical Framework

The aim of this chapter is to review the existing literature in light of my research question. I will use this existing literature as a starting point to develop my own theoretical framework to determine which conditions are relevant for the onset of drought-related political unrest in sub-Saharan Africa.

There have been hundreds of publications on the topic of climate-conflict linkages (Hendrix & O'Loughlin, 2019). The conclusions have been mixed, with some arguing for large climatic consequences for conflict at many temporal and geographical dimensions, while others contend that climate-conflict ties are exaggerated—in both specific cases and more broadly (ibid.). According to Hendrix and O'Loughlin, this problem is accentuated by general science journals, which want strongly stated and univocal titles. This leads to opposite findings being published in the same journal: In 2009, the Proceedings of the National Academy of Sciences published a paper by Burke et al. (2009), which is titled 'Warming increases the risk of civil war in Africa', while less than a year later, the same journal published a paper by Buhaug (2010), which is titled 'Climate not to blame for African civil wars'.

The reason for the diverse results is the fact that each researcher uses different research designs, datasets and methods (Mach et al., 2019). Before diving deeper into the debates about the causal mechanisms in the existing literature, it is therefore wise to give a brief overview of the different strands in the climate-conflict literature and why these differences come about. After that, I will give a definition for political unrest and enumerate the ways in which other researchers have found that climate influences political unrest. Thereafter, I will discern eight causal conditions that I find to be particularly relevant for drought-political unrest links in sub-Saharan Africa.

Over the past decade, the literature on environment security has expanded significantly in both volume and scope (Von Uexkull & Buhaug, 2021). In the study of climate-conflict links, a stark distinction between qualitative and quantitative studies can be made: they tend to vary not only in method, but also in outcome (Ide, 2017).

The majority of qualitative case studies that examine the relationship between climate change and conflict use one or more of the following three approaches (Ide, 2017): First, they use process tracing to figure out what causal relationships (if any) exist between a (predicted) manifestation of climate change and collective violence (see e.g. Gleick, 2014; Schilling, Opiyo & Scheffran, 2012). Second, they collect and evaluate data in a less structured and anthropological manner, condensing it into a narrative of climate–conflict linkages (typically based heavily on local residents' perspectives) (see e.g. Adano et al., 2012; Tubi & Feitelson, 2016). Finally, they work in the historical materialism and political ecology traditions and use the contextualization approach to explain how climate change, environmental stress, and conflict are profoundly intertwined in, and consequently created by, larger sociopolitical processes (see e.g. De Châtel, 2014; Newell & Bumpus, 2012). Most quantitative environment security research focuses uses disaggregated data instead of country-level data when trying to assess the influence of climate change on conflict (see e.g. Harari & La Ferrara, 2018; Döring, 2020; Raleigh et al., 2015). In addition to this, to mitigate the scarcity of socioeconomic and political data on relevant social actors, there has been a steady growth in the usage of surveys in that measure

individuals' perceptions and actions during environmental hazards in quantitative environment security studies (Von Uexkull & Buhaug, 2021).

In large-N statistical studies, it is likely that a potential relationship between climate change and conflict is not as robust as other factors of violent conflict (ibid., p. 3). Moreover, statistical studies ultimately detect correlations rather than causal links. Quantitative researchers themselves conceive that they do not have a sufficient explanation of climate-conflict links, as they cannot say 'why their model works' (Ide 2017, p. 4). The quantitative comparative literature is generally lacking in theory, and explanations for observable patterns (or lack thereof) are frequently created post hoc (Buhaug, 2015, p. 270). Buhaug argues that theory in quantitative research seems to be undervalued, because causal frameworks in theoretical literature are often too complex to evaluate empirically (ibid.). Qualitative case studies can provide explanations for these correlations by detecting causal pathways, or they can explain why they found the correlations are misleading (Ide, 2017, p. 6). However, qualitative case studies, too, are not free of problems. Case studies can hardly account for weak, unobservable links connecting climate change to conflict, whereas quantitative studies might be able to do this (Ide, 2017, p. 5). An example would be the temperature-aggression nexus: higher temperatures are hypothesized to increase violent behavior, but this would be very hard to detect using qualitative methods. This can lead to blind spots in case studies that could be potentially significant. In addition to this, it remains questionable if findings of a few locations can be applied to a wider set of cases, leading to a lower external validity.

2.1 Political unrest

Political unrest is notoriously hard to define without neglecting one of its many dimensions (Tarkhani, 2021, p. 692). Most of the definitions include some reference to riots, anti-government protests, strikes directed towards a (national) government, or a combination of these factors (ibid.). There is no consensus definition of political unrest that is clearly preferable above others (ibid.). One could argue that political unrest would be the same as the absence of political stability. For years, the widely accepted definition of political stability among political scientists was from Lipset (1959), who defined it as the continuation of a political system. Although important for the general conception of political instability, this dimension of political unrest seems to be less relevant for this thesis, as I focus more on the sociopolitical tension-side of political unrest. Siermann (1999) delves deeper into this dimension by stating that political unrest can be defined as *violent* political events that occur in a country. These violent events can be strikes, riots, coups and politically motivated killings (ibid.).

As stated in the introduction to this thesis, I explicitly want to look at *non-violent* political events, as their violent counterparts have been covered more extensively in the existing academic literature. This means that I need to look elsewhere for a suitable definition for my conception of political unrest. Moving away from a theoretical debate about which dimensions should be included and which should be omitted and instead focusing more on a practical approach, I find the definition Raleigh et al. (2010) use in their Armed Conflict Location and Event Dataset (ACLED) to be particularly straightforward and useful: (non-violent) demonstrations for political causes (Raleigh et al., 2010). Political causes can include opposition against or demands for policies, laws, governance practices or regulations (ibid.). As I select my cases of political unrest from ACLED, I will follow this

definition for political unrest in my thesis. I will go into deeper detail on ACLED in the Methods and Data chapter of this thesis.

Political unrest is frequently a critical factor in forming public policy (Tarkhani, 2021, p. 693). This is true for modern democracies, but especially in developing countries political unrest can be a powerful driver of societal change (ibid.). A large number of scholars finds causal links between poor economic conditions and political unrest (Tarkhani, 2021, p. 696). Although the different individual research varies in scope and perspective, the main causal relation boils down to the fact that when people are aware of their (relatively) poor economic conditions, they choose to resort to disruption of existing social and political practices (ibid.). One of the best examples of this argument is the Arab spring, as people in those Arabic countries suffered from sustained low economic growth and poverty, which ultimately led them to revolt against their governments (ibid.).

Parvin (1973) suggests that there is always some degree of political unrest in almost all societies. He states that this political unrest only transforms in actual political demonstrations and civil disobedience when a significant amount of people experiences the same feelings of dissatisfaction and frustration with their existing socioeconomic status (Parvin, 1973, pp. 271-272). Natural disasters can be an important causal agent of this dissatisfaction and frustration as disasters increase people's immediate social demands (Olson & Drury, 1997, p. 227). If governments neglect these demands, this dissatisfaction is likely to intensify and grow into political unrest (ibid.).

2.2 What causes droughts (and related disasters) to influence political unrest?

Even though there is a suggested linkage between conflict and climate, the underlying causal mechanisms are unclear or are under debate (Helman, Zaitchik & Funk, 2020, p. 1). This debate encompasses multiple disciplines, ranging from archeology and history to psychology and criminology to geography, economics and political science (Hsiang, Burke & Miguel, 2013, p. 1213). One linkage that is often suggested is that climate and conflict link through economic disruption (Helman et al., 2020, p. 1) Although this connection is theoretically plausible, there is at the moment of writing no robust evidence for this claim (ibid.). Instead, many studies suggest that climate hazards may lead to conflict through a combination of socioeconomic and political failures, particularly in regions where people are dependent on beneficial climate for their livelihoods (ibid.). The suggested linkage, in that case, is that climate influences the economy, which influences social and political systems. If these systems take a hit, people are more likely to resort to conflict (ibid.).

Other, less direct climate-conflict connections focus on the so-called 'engagement hypothesis', which claims that climate may have long lasting effects on the economy, potentially altering the way the entire economy is structured (Helman et al., 2020). The engagement hypothesis assumes that when a climate crisis permanently reduces economic productivity, it is ultimately more beneficial for people to engage in intergroup conflict rather than in economic activities (ibid.). Linke & Ruether (2021), for example, argue that edible crops and arable land for producing staple foods can be particularly valuable during war. When the economy does not serve its people anymore, vulnerable people would be incentivized to acquire such valuable assets by means of conflict (ibid.). Economic desperation creates an incentive for people to resort to conflict with other communities in a direct effort to alter the allocation of resources that have turned scarce because of the climate hazard (Fjelde & Von Uexkull, 2012, p. 444). People may join an ongoing conflict or rebellion as a result of adverse changes

to their livelihood or the prospect of short-term gains (Van Weezel, 2020, p. 9; Maystadt & Ecker, 2014). In an alternative approach, researchers hypothesize the way climate indirectly influences conflict is expressed in the 'inequality hypothesis', which argues that conflict increases when climate inequality upsurges economic inequality, because of increasing efforts to redistribute vital assets, making some people 'winners' of the crisis, while others 'lose' their previously free access to these goods (Helman et al., 2020; Von Uexkull et al., 2016). De Juan & Hänze (2020), for example, claim that as environmental conditions worsen, (newly) restricted access to essential goods such as water and food triggers competition among groups. Yet another example of an indirect climate-conflict connection is the 'state weakness' hypothesis, which suggests that a decline in economic productivity leads to a weakening of governmental institutions, which results in a reduced ability to suppress violent unrest (Helman et al., 2020). Some environmental security research claims that climate hazards such as droughts are drivers of urban migration, as was the case in Syria (Linke & Ruether, 2021, p. 115). This change, in turn, amplified existing grievances among the people living in the cities, which led to protests in the first half of 2011 (ibid.).

As shown, there is a great variety of contrasting hypotheses and suggested causal mechanisms, which is a reflection of the disagreement within the current literature on climate-conflict links. Although some researchers have claimed that the link between climate and conflict is unsupported by empirical evidence and that if there is empirical evidence, it is because researchers have a bias in their approach to the problem, most experts do believe that climate has a significant effect on conflicts (Helman et al., 2020, p. 2). Moreover, the alleged contradictory evidence of climate-conflict links appears to be overstated (Hsiang et al., 2013, p. 1221). There are studies that estimate that temperature and rainfall events such as droughts have a limited impact on conflict, but these results only represent less than 5% of all reported findings (ibid.).

2.3 Conditions and contexts

Even though a causal link between climate and conflict seems to exist, the underlying mechanisms and the generality of the links are yet to be established. Like other scholars (i.e. Ide et al, 2020a; Ide et al, 2020b), I argue that droughts are only likely to cause political unrest under specific circumstances. Some of these circumstances are difficult to analyze in a cross-case study in a geographical area where more than 1 billion people live, such as sub-Saharan Africa, because they are highly idiosyncratic (e.g. how local state representatives might react to the drought, whether a household is vulnerable to droughts, etc.). Other vulnerability factors, however, are of systematic nature and lend themselves superbly for a cross-case analysis. These systematic factors often interact with each other. Unlike the abovementioned – and widely used – causal hypotheses, I would argue against deterministic perspectives on climate-conflict links. Following Barnett (2018) and Gleditsch (2020), I do not believe that it is a natural law that climate change leads to (non-violent) conflict, but that there are combinations of complex contextual factors that allow droughts to lead to political unrest. To get a better grip on this complexity, I will go deeper into each specific part of the causal puzzle and probe into the existent literature on each specific (potential) condition in which droughts might lead to political unrest. Following the existing environment security literature, I find the following eight pieces of the causal puzzle – the causal conditions – to be particularly salient.

2.3.1 Drought duration

Von Uexkull et al. (2016) conclude that prolonged duration of a drought increases the likelihood of conflict involvement. In other words, all else being equal, the longer a drought lasts, the more likely it is that unrest will come about. This causal effect can build on both the inequality hypothesis and the state weakness hypothesis. When people are exposed to a relatively long-lasting drought, it is more likely that, over time, they lose access to valuable assets such as water that they might still have in reserve when the drought would have lasted for a shorter time, making it more likely to be a 'loser' of the crisis, which would create political unrest (Helman et al., 2020). Another way a long drought might fuel unrest is when the economic productivity of a country declines for a longer period of time, state institutions are more prone to be affected. State institutions are defined as the sum of state agencies that have the power or jurisdiction to formulate and enforce binding regulations for all citizens and are headed and coordinated by the state's executive authority (Homer-Dixon, 2001, p. 98). One could reasonably suspect that state institutions are able to endure a short drought-induced economic decline. However, when this economic decline sustains, the same institutions might not be able to cope (Helman et al., 2020).

2.3.2 Heavy impact

The more severe a drought, the more people should be affected. This implies a larger group of people to potentially participate in protests, more severe grievances and a stronger support for the affected communities (Gawronski & Olson, 2013; Ide et al., 2020a). A way of measuring the impact of a drought would be to focus on loss of lives, livelihoods, assets or (temporary) displacement (Ide et al., 2020a), but since reliable data are practically unavailable and retrieving those datapoints would be too time consuming within the scope of this thesis, I instead choose to compute my own variable for heavy impact. In this thesis, the impact of a drought refers to the number of people that are affected, divided by the total population of the affected community (or communities). This number is then divided by the drought duration. In this way, I can still assess whether a community is hit particularly hard by a drought without having to rely on data that is virtually inaccessible.

2.3.3 Season

According to Harari & Ferrara (2018), the joint effect of below average precipitation, water evaporation and high temperatures during the growing season lead to an increase in conflict likelihood. Maystadt, Calderone & You (2014) find that this effect is particularly persistent in the growing season relative to the other agricultural periods, such as sowing or harvesting seasons (Maystadt, Calderone & You, 2014, p. 663). The reason that droughts have the strongest relationship with conflict during the growing season is because this is the time when farming households incur the greatest income losses (Linke & Ruether, 2021, p. 116). Especially low levels of precipitation in the 2004 and 2005 growing seasons, for example, led to a sharp decrease in agricultural production, affecting the lives of almost 12 million people across Kenya, Uganda, Tanzania, Malawi, Mozambique and Gambia (De Juan & Hänze, 2020, p. 152). Along the lines of the 'engagement hypothesis', Linke & Ruether (2021) argue that poverty resulting from crop failure can compel affected people to try and earn a living by supporting or committing violence (Linke & Ruether, 2021, p. 116). Conversely, Harari & Ferrara find that droughts have virtually no effect on conflict outside of growing season (Harari & Ferrara, 2018, p. 595).

2.3.4 Agricultural dependence

Helman et al. (2020) find that drought induced conflicts are mostly found in agriculture-dependent areas. De Juan & Hänze (2020) argue that this is likely the case because shocks to agricultural production as a result of a drought have particularly pronounced livelihoods effects on regions that are historically dependent on rainfed agriculture. They expand on this by saying that losses in farming spill over to the rest of an agriculture-dependent society: drought induced yield losses reduce access to food, are likely to trigger increases of crop prices and can reduce household incomes for both farmers and other people working in the agribusiness (De Juan & Hänze, 2020, pp. 153-154; Linke & Ruether, 2021, p. 116). Vesco et al. (2021) find that areas with higher concentrations of crop production increase the likelihood of conflict onset and condition the effect of climate variability on violence. Sub-Saharan countries in particular remain highly dependent on rain-fed agriculture for both employment and economic production (Burke et al., 2009, p. 20670), making them especially prone to conflict.

2.3.5 Pre-existing cleavages

In the face of existential threats, affected people can rally around salient identities, which often goes along with out-group polarization (De Juan & Hänze, 2020, pp. 151-152). Both processes increase the likelihood that scarcity as a result of climate induced disasters such as droughts will trigger conflict across identity groups (ibid.). A high level of in-group trust is one of the most important psychological mechanisms underlying all kinds of collective action, including mobilization for conflict (De Juan & Hänze, 2020, p. 153). Remaining inter-group trust decreases even further when inequality between different identity groups increases (De Juan & Hänze, 2020, p. 152). Harari & Ferrara (2018) also find that pre-existing cleavages lead to an exacerbated impact of extreme weather shocks such as droughts. Although ethnicity is not the only cleavage conducive to mobilization, pre-existing social structures in the form of ethnonational identities are particularly salient to solve the collective action problem for mobilization (Von Uexkull et al., 2016, p. 12391).

2.3.6 Ethnopolitical exclusion

Pre-existing cleavages such as ethnonational identities oftentimes – but not per definition – coincide with ethnopolitical exclusion. Von Uexkull et al. (2016) find that ethnopolitical exclusion is a salient driver of conflict, because some politically relevant ethnic groups are more vulnerable to an environmental shock, while many other groups are reasonably resilient to drought. Following the inequality hypothesis, the least vulnerable groups are part of the regime's 'winning coalition', which allows them to enjoy economic benefits and political privileges the 'losing coalition' does not have (Von Uexkull et al., 2016, p. 12394). Moreover, marginalized ethnic groups tend to be more dependent on agriculture for their livelihoods, which makes them particularly vulnerable to droughts (ibid). For these excluded groups, research shows that the occurrence of drought increases the likelihood of sustained conflict involvement (ibid.; Ide et al., 2020a, p. 86; Harari & Ferrara, 2018, p. 595). In addition to this, discriminated groups are less likely to receive state-sponsored relief and in some cases, governments may even choose to restrict international aid and NGO access to the excluded groups (Venugopal & Yasir, 2017; Zeccola, 2010). Conflicts are likely to arise over the distribution of these resources (Hendrix & Salehyan, 2012). Drought-related grievances are exaggerated among marginalized groups, which only adds to the already existing resentment against

the government that excludes them, and therefore increases the likelihood of unrest (Ide et al., 2020a, p. 86).

2.3.7 Democratic regime

The nature of a political system is likely to shape the response of a state to a disaster (Ide et al., 2020a, p. 86). The nature of these responses influences the likelihood of drought-related unrest (ibid.). One could reasonably argue that democracies (both full and flawed democracies) provide opportunities for citizens to express grievances, while autocratic regimes might provide fewer of those options, which may incentivize people to look elsewhere to express their dissatisfaction with the way a government is handling a climate hazard and will resort to (organized) political unrest. Moreover, autocracies are more likely to respond to disasters in repressive ways, which could also lead to political unrest (Pfaff, 2020).

2.3.8 Socioeconomic development

Helman et al. (2020) find that violent conflicts are most often found in low socioeconomic areas. Low-water availability as a result of droughts have been associated with organized political conflicts, especially in low socioeconomic development contexts (Hsiang et al., 2013, p. 1221). Linke & Ruether (2021) expand on this by saying that in countries with particularly low socioeconomic development, irrigation infrastructure, institutions that manage resource use, food security and poverty reduction programs might be subpar. In addition to this, countries with low socioeconomic development may also lack sufficient groundwater reserves which are a vital buffer in times of drought (Döring, 2020, p. 2). The more difficult access to well-functioning groundwater reserves is, the more likely it is that the affected people will resort to conflict (ibid.). The respective states often also lack sufficient preparation and recovery systems, making them particularly vulnerable (Ide et al., 2020a, p. 86). The combination of livelihood loss and dire prospects for recovery because of insufficient state responses can therefore trigger a sense of frustration which may ultimately lead to political unrest (ibid.).

Following leading researchers, I use Infant Mortality Rates (IMRs) to measure a country's socioeconomic development (see e.g. Von Uexkull et al., 2016). IMR is a proxy for country-level socioeconomic development and is strongly related to human welfare and state security (Von Uexkull et al., 2016, p. 12392). In contrast to GDP, another widely used proxy for socioeconomic development (see e.g. Ide et al., 2020a), IMR is less immediately affected by commodity price fluctuations and most importantly, less endogenous to conflict and political unrest (Von Uexkull et al., 2016, p. 12392).

Naturally, there are other relevant factors that explain drought-related political unrest, but these eight conditions seem to be especially relevant for two reasons. The first reason is that these factors are among the most discussed in the existing literature. The second reason is that these conditions are likely to interact with each other. For example, pre-existing cleavages might be an important precondition for ethnopolitical exclusion, but without a heavy impact or a prolonged drought duration, they are unlikely to be sufficient drivers of conflict (and vice versa). Although all of these conditions have been tested individually as independent variables in the existing research, the combination of these factors is severely understudied (Ide et al., 2020b). I, on the other hand, am particularly interested in the *interactions* between different conditions, as I expect that the drought-

unrest link depends heavily on different contextual factors. The QCA method that I employ in this thesis is particularly sensitive to these interactions. Although QCA has been used before to test different combinations of factors - most notably by led by Tobias Ide (Ide et al., 2020a; Ide et al., 2020b) – they neglect some of the most widely covered individual variables in the existing research, such as agricultural season, socioeconomic development and agricultural dependence. By contrast, I choose to utilize all of the prevalent structural conditions from earlier research.

3. Methods and Data

3.1 An introduction to QCA

Charles Ragin, an American sociologist, invented QCA in the 1980s. He created QCA as a comparison method for determining causation, or the cause-effect relationship. To that end, QCA combines "the best features of the case-oriented approach with the best features of the variable-oriented approach," as Ragin (1987) put it at the time. Qualitative research is known for its case-based methodology. Case-oriented research produces in-depth and extensive summaries of entire cases. However, case-oriented studies tend to focus on just one or a few cases, making it difficult to generalize their conclusions. Furthermore, when these studies do cover multiple cases, a systematic and transparent technique for cross-case comparison is usually missing (ibid.). The variable-oriented approach used in quantitative research, on the other hand, allows for the examination of large samples or populations as well as systematic cross-case comparison. Quantitative methods, however, may not provide specific information about particular cases, and the type of causation they evaluate may not always correlate to how things occur in reality (ibid.). QCA aims to provide a viable alternative to the net effects approach in particular. In a nutshell, this method identifies between independent variables, which are factors that potentially cause an outcome, and evaluates which independent variables have the most impact individually. Conversely, QCA seeks to investigate a more complicated conception of causality by combining the case-oriented approach's strength of assessing within-case complexity with the variable-oriented approach's strength of systematic cross-case comparison (ibid.).

The analytic part of QCA research begins with developing a so-called ‘intimacy with the case’ by thoroughly exploring detailed case descriptions and exploring primary and secondary sources with a fine-tooth comb (Ragin, 1987). As a result, the focus of this stage of the research is on within-case, in-depth complexity. The following stages of the research process evaluate cases with much more parsimony: a truth table is created that relies on binary scores that indicate the presence and absence of conditions. In other words, cases are merely described in terms of a score for each condition and the outcome, contrary to the in-depth intimacy that is developed at the beginning of the research process. In the truth table, combinations of conditions are presented. In the logical minimization process, condition combinations are systematically compared. Via this combinatorial approach, the different parts of a case are assessed in relation to each other and as a whole, rather than being separated from their case contexts (Ragin, 1987). In this way, QCA tries to preserve the case's integrity and complexity throughout the parsimonious phase. In the last phase, the researcher returns to the cases and interprets the result of the logical minimization, which is yet another aspect of QCA’s case-orientedness. Thus, in each step of the research process, QCA remains case-oriented, even though cross case comparisons are made.

3.1.1 Set theory and complex causality

As stated before, QCA focuses on complex causality, which has several characteristics: first, QCA looks into how conditions *interact* as a causal recipe to produce a result, which is called conjunctional causality. This method of determining causation differs from the net effects approach, which focuses on the effect of individual variables (Wagemann, 2017). Equifinality is another characteristic of complex causality, which means that multiple conditions or combinations of conditions can lead to

the same result. QCA also determines whether and how a condition behaves differently in different situations. In one case, the *presence* of a condition may result in a particular outcome, whereas in another case, the *absence* of that condition may result in the same outcome. In other words, there is not only one but several possible explanations, all of which are equally valid (Schneider & Wagemann, 2012, p. 78). As a result, QCA enables context-specific causal analysis. Following the idea of equifinality, there might for example be different trajectories of drought-related unrest in different countries, which are captured in different explanatory paths (Wagemann, 2017). Finally, QCA looks into asymmetric causality. Asymmetry refers to the fact that the recipe for the occurrence of an outcome is not simply the inverse of the recipe for its non-occurrence. As a result, the explanation for the outcome's non-occurrence cannot be deduced from the explanation for the outcome's occurrence: the outcome's non-occurrence must be analyzed separately (Wagemann, 2017). Together, these dimensions of complex causality are called "configurative" causality (ibid.).

QCA enables configurative causality because of its set theoretic approach. With calibration, the researcher determines whether cases are member of the sets with the outcome of interest and the corresponding conditions. The relation between a set of cases that share a particular condition (or more likely: a combination of conditions) on the one hand and the set of cases with the outcome on the other hand may have causal significance.

To illustrate this, I will use a fictional scenario in which a researcher is interested in the causal relationship between heavy thunderstorms and political unrest. The researcher could for example look into a set of countries that had did not provide nationwide thunderstorm-safety precautions. Suppose that all countries with that condition (absence of safety precautions) are also member of the outcome sets of countries where a heavy thunderstorm has led political unrest. Not all countries with thunderstorm-induced political unrest have failed to hand out safety precautions, but the reverse is true: all countries that did not hand out safety precautions have experienced thunderstorm-related unrest. In that case, the condition set of countries without safety precautions would form a part, or a *subset*, of the outcome set of countries with thunderstorm-related unrest. This can be interpreted as an indication that the absence of safety precautions is conducive to thunderstorm-related unrest, because whenever countries failed to hand out precautions, there was political unrest. In set theoretic terms, the absence of safety precautions is a sufficient condition for the outcome: the absence of safety precautions by itself leads to political unrest.

This illustration is a simple example with just one condition. The same line of reasoning can be applied to more complex models with multiple conditions. Suppose, for instance, that the same researcher finds that only countries that did not hand out safety precautions (condition X1), and have a religious tradition in which people see thunderstorms as punishment from the gods that people must submit themselves to (condition X2), have outcome Y, thunderstorm-related political unrest. In this case, it is a set of cases that share a combination of conditions that forms a subset of the outcome. In other words, it would be a combination of conditions (or a configuration) that is sufficient for the outcome.

There could also be a situation where the outcome (political unrest) always occurs in countries where every house is made with straw roofing. In that case, the set of countries with condition X, the straw

roofing, is a superset of countries with outcome Y, thunderstorm-induced political unrest. This means that all cases with outcome Y also have condition X. X, in set theoretic terms, is a necessary condition for Y: without X, Y cannot occur.

Lastly, a condition can be INUS, which means it is insufficient for the outcome, but a necessary part of an unnecessary configuration that is sufficient (Mackie, 1980). Say, for instance, that the researcher has found a case where there was an extremely severe thunderstrike that led to a nationwide riot. The lightning struck a holy site that was ill-prepared for heavy thunderstorms, destroying it in the process. The researcher concludes that according to the INUS condition, the thunderstrike caused the riot:

1. 'Lightning' is not a sufficient part of the condition "lightning destroys holy site", as the 'holy site' is missing;
2. The lightning, however, is a necessary part
3. The condition "lightning destroys holy site" is not necessary for the outcome: we have seen that it can be replaced by other conditions to get the same outcome (political unrest), such as the absence of nation-issued safety precautions.
4. "Lightning destroys holy site" is a sufficient condition, as it will lead to political unrest

By analyzing how sets relate to each other and by theorizing the causal significance of their relation, it becomes possible to investigate configurational causality, which is the core business of QCA.

3.1.2 Crisp vs. fuzzy sets

Calibration is about assigning membership scores to cases (Schneider & Wagemann, 2012, p. 24). These scores reflect whether (or to what extent) cases are members of the sets of the outcome and the conditions. The scoring must be done for each case individually. The two main methods of calibration in QCA are either crisp or fuzzy calibration. In the case of crisp calibration, the researcher determines whether cases are members of sets; a case can either be in or out a set, there is no middle ground. This method is called crisp-set QCA, or csQCA (Schneider & Wagemann, 2012, p. 23). This variation of QCA is widely used and is entirely valid, but there are an increasing amount of studies that use the alternative fuzzy-set QCA, or fsQCA. FsQCA allows for a more specific calibration, where the researcher can indicate to what degree cases are members of sets. There are also other variations of QCA, such as multi-value QCA, or mvQCA, but these are not yet widely used (Schneider & Wagemann, 2012, p. 27).

With csQCA, the conditions can only be calibrated in either a '1' for present or '0' for absent (Schneider & Wagemann, 2012, p. 24). In other words, zero means that a case does not have the condition, while one means that a case does have the condition. With fsQCA, on the other hand, conditions can be calibrated in numerous different ways, one a scale from '0' (absent) to '1' (present) (Schneider & Wagemann, 2012, p. 27). This allows for a degree to which a case can be member of a set. A researcher could, for example, be interested in government corruption. In this hypothetical scenario, she has theoretical grounds to think that the more democratic a country is, the less prone it is to government corruption. She therefore chooses to include 'democracy' as a condition. However, following her hypothesis, she not only wants to differentiate between democracy and non-democracy, she also wants to differentiate between democracies. She argues that although, for example, France and Norway are both regarded as democracies, there are differences between those two regarding

pluralism and civil liberties. She therefore chooses to calibrate Norway with a score of '0.9', while France is calibrated as '0.8' for this condition. Note that the researcher not only chooses to use fsQCA because it is allows for more nuance in her calibration, she also has substantive grounds to use fuzzy sets (i.e. she is interested in the degree of democracy, because she hypothesizes that *the more democratic a country* is, the less prone it is to government corruption).

The distinct advantage of using csQCA relative to fsQCA or mvQCA is that it is easier to conduct and, more importantly, that it can be conducted with a small(er) number of cases (Sehring, Korhonen-Kurki, & Brockhaus, 2013, p. 14): both fsQCA and mvQCA require more cases to establish significant findings and generally have a large amount of logical remainders that need to be sorted out (ibid.). Moreover, while partial set-membership for the conditions is possible, csQCA is the superior choice for this thesis, as the relevant outcome can only have two values (either the occurrence or absence of drought-related conflict). This makes fuzzy sets mathematically infeasible (Ragin, 2009).

3.1.3 The purpose and construction of a truth table

Through calibration, each case is given points for the outcome and the conditions. These scores are represented in a data matrix and show whether cases belong to the groups of cases with the same outcome and conditions. The next phase looks at the relationship between sets of cases that share a set of conditions on the one hand, and sets of cases that have the same outcome on the other. This can be done by means of a truth table. The truth table is a derivative of the data matrix, and both the truth table and the data matrix describe cases in terms of conditions and an outcome, but the data is structured differently (Schneider & Wagemann, 2012, p. 92). Data matrix rows mention set membership scores for one case. Truth tables, on the other hand, describe the outcome for each possible combination of present and absent conditions, for all cases that share that particular combination of conditions. By doing so, the truth table enables the identification of subset relations; it identifies which truth table rows are sufficient for the outcome (Schneider & Wagemann, 2012, p. 93).

3.1.4 Consistency

Related to the truth table is the topic of consistency, the next step in QCA analysis (Schneider & Wagemann, 2012, p. 123). If cases with the same condition or configuration have the same outcome, the cases are considered a subset of the outcome's instances. In such a relation, the configuration might be read as sufficient for the outcome. Whether subset relations and sufficiency exist can be determined via consistency. Assessing whether truth table rows are sufficient is an important step before the process of logical minimization. In csQCA, the proportion of cases in a truth table row that represent the outcome indicates consistency. A configuration is considered to be sufficient if it consistently displays the outcome. For example, if there are 10 cases with the same configuration, and 9 of those cases display the outcome (Y = 1), while one does not (Y = 0), the proportion, or the consistency, is 0.9. Rows from the truth table with a consistency of at least 0.75 may be deemed sufficient for the outcome (Schneider & Wagemann, 2012, p. 127). If configurations are below this threshold of 0.75, they are deemed insufficient and will be left out in the logical minimization process (ibid.).

3.1.5 Logical minimization

The purpose of logical minimization is to systematically compare between different sets of conditions that are deemed sufficient for the outcome (Schneider & Wagemann, 2012, p. 105). The sufficient combinations of conditions in the truth table rows are called *primitive expressions*. It is possible to describe these expressions by the use of Boolean operators, such as the '*', which means 'AND', and the '+', which means 'OR', and the '~', which means 'NOT'. As an alternative to the tilde, conditions can also be written in upper case for 'present' and in lower case for 'absent'. For legibility reasons, I choose to use the upper and lower case variant to show whether a condition is present. The last Boolean operator is the '→', which means the conditions are connected to the outcome (Schneider & Wagemann, 2012, p. 93). So, A → Y means that A is sufficient for Y.

The goal of logical minimization is to find a simpler notation of the primitive expressions (Schneider & Wagemann, 2012, p. 106). Simpler means shorter, with less operators and without redundant elements (ibid.). The rationale for such a comparison is as follows: If two primitive expressions that lead to the outcome Y = 1, but differ in one condition, which is present in one expression but not in the other, that condition does not play a role in the occurrence of the outcome. In other words, it does not matter if that condition is present or not, the outcome will be the same regardless. As a result, that condition is logically redundant and can be left out (Schneider & Wagemann, 2012, p. 105). The researcher needs to find these simplifications for all couples of primitive expressions that differ in one condition. When all these primitive expressions are accounted for, the researcher is left with prime implicants, or solution terms (Schneider & Wagemann, 2012, p. 110). These can be combinations, but they may just as well be single conditions (ibid.). The prime implicants together form a solution. Sometimes, the solution that follows from the comparison of primitive expressions is also the *minimal formula*, but this does not necessarily have to be the case (Schneider & Wagemann, 2012, p. 108). In these instances, the solution can be minimized even further by omitting *logically redundant prime implicants*. A prime implicant is redundant if its primitive expressions are already covered by other prime implicants (ibid.). The logically redundant prime implicants can be found by making a prime implicant chart (Schneider & Wagemann, 2012, p. 110). When all the redundant prime implicants are removed, the shortest possible solution is found, which is called the minimal formula (Schneider & Wagemann, 2012, p. 110). Removing a redundant prime implicant is optional; a researcher may choose to leave it in for theoretical or empirical reasons (Schneider & Wagemann, 2012, p. 111). Although the software that is used for this thesis conducts the minimization process for the user automatically, it is important to know how the minimization works to give meaning to the solution (Schneider & Wagemann, 2012, pp. 93-94).

As mentioned before, there is consistency for truth table rows. Related to that is consistency for the solution. Consistency, in that case, refers to the extent to which solution terms and the solution as a whole are subsets of the final outcome and is called a parameter of fit (Schneider & Wagemann, 2012, p. 139). In crisp sets, consistency is the proportion of cases in a set of conditions which are also in the outcome set (Schneider & Wagemann, 2012, p. 129). Configurations with a consistency of at least 0.75 can be regarded consistent subsets of the outcome and can be seen as sufficient (Schneider & Wagemann, 2012, p. 129).

Another parameter of fit is coverage. Coverage reveals how much of the outcome is explained by a solution term or the solution as a whole. This denotes the significance and empirical importance of a certain solution term or the entire solution (Schneider & Wagemann, 2012, p. 139). Unlike consistency, coverage does not need a minimum value before it is deemed informative or before it is accepted (Schneider & Wagemann, 2012, p. 139).

3.1.6 Criticisms of QCA

Although QCA is well suited to uncover causal links between conditions and outcomes that are strongly dependent on the presence or absence of numerous (combinations of) context factors, it can only account for a limited number of causal conditions in comparison to other, typically Large-N approaches (Ide, 2017). This is why QCA is considered to be best suited for Medium-N or, when done conservatively, moderately Large-N studies (ibid.). As a result, QCA results can potentially be less generalizable than statistical analysis (ibid.). Finally, QCA, like other research methodologies, might suffer from measurement errors, data biases, and a lack of sensitivity to the local environment (if employing a higher number of cases) (ibid.).

However, especially in the climate-conflict research area, QCA holds distinct advantages over other methods. Potential climate–conflict links are hypothesized to manifest themselves only under very specific circumstances (Ide, 2017). QCA allows for relatively high context-sensitivity, which is why it lends itself well for climate-conflict research. Furthermore, QCA can distinguish between several causal pathways as well as necessary, sufficient, and irrelevant conditions for a given outcome, enhancing its ability to untangle complicated relationships in climate–conflict research (ibid.). Another important advantage of QCA is that the calibration technique allows quantitative (e.g. number of affected people) and qualitative (e.g. ethnopolitical exclusion) data to be incorporated in the same study. These advantages show that if one is aware of the drawbacks related to the method and can reflect on them in a discussion of the findings, QCA should be a meaningful addition to the climate-conflict research, which is why the method is used in this thesis.

3.1.7 Pitfalls in csQCA

The main weakness of csQCA specifically is that it requires binary values, which may be difficult to calibrate (Sehring et al., 2013). Conditions can be either present or absent; there is no room for gradual assessment (ibid.). This means that even conditions such as socioeconomic development and drought duration need to be classified as absent or present, or ‘true’ or ‘false’ (ibid.). Binary coding inevitably leads to a loss of information, which can rightfully be considered to be a loss of contextual richness (Sehring et al., 2013, p. 18). As a result, defining the only threshold needs to be truly theory based, but will always leave room for subjectivity and will be questioned in many cases (ibid.).

3.2 Case selection

The three main elements of a research model in QCA are the outcome, the conditions, and the cases (Schneider & Wagemann, 2012, p. 32). The first two aspects, conditions and outcomes, have a clear link. Conditions are viewed as possible causes of a specific outcome. Such conditions and outcomes are investigated in cases. In that way, cases form the third main element of a research model. The outcome and conditions should be selected on the basis of both theoretical and case knowledge (Schneider & Wagemann, 2012, p. 33). This is required to ensure that the research model includes

appropriate cases and that the result and conditions are relevant and well-founded. Useful data can both be primary as well as secondary (Schneider & Wagemann, 2012, p. 32). A key feature of the used data is that it should give enough information to do the calibration process. Calibration refers to giving scores to cases for each condition and the outcome. This reflects whether cases are members of sets.

QCA is often used for a limited number of cases, typically between 10 and 100. With regards to the minimum number of cases, one rule of thumb is that the number of cases should ideally be at least four times the number of conditions (Kusa, Duda & Suder, 2021, p. 238). In this thesis, I have 8 conditions, which means that my threshold is a minimum of 32 cases. Since I use 37 cases, I meet these requirements. Apart from the number of cases, the composition of the cases should also be selected purposefully. The aim is to select cases that are similar enough to compare. This similarity should be inferred from the outcome. This means that the definition of the outcome should be clear enough. When 'political unrest as a result of drought' is the outcome, all cases should logically be instances of drought. Although no drought is the same, they need to be sufficiently similar. This similarity among the selected cases provides a homogeneous zone within which the cases should be as diverse as possible in terms of outcome and conditions (Schneider & Wagemann, 2012, p. 94). This is the second aim of case selection: there need to be cases with and without the outcome and with and without the conditions of interest. In sum, the challenge is to select cases that are homogenous in baseline characteristics but varied in conditions and outcome (ibid.).

3.2.1 Droughts

In order to draw my sample of drought-affected countries, I use the EM-DAT International Disaster Database, which systematically collects and analyzes the impact of disasters on vulnerable populations (EM-DAT, 2008). At least one of the following conditions must be met for a disaster to be added into the EM-DAT database (ibid.):

- At least ten (10) persons have been reported killed;
- At least a hundred (100) people have been affected;
- A state of emergency has been declared;
- A request for foreign aid is made.

In the dataset, droughts are regarded as climatological disasters, which are "hazard[s] caused by long-lived, meso- to macro-scale atmospheric processes ranging from intra-seasonal to multi-decadal climate variability" (EM-DAT, 2008). Since all droughts in the EM-DAT dataset need to adhere to this definition, I regard them as sufficiently similar to include them into this thesis. EM-DAT allows selection of a specific region when downloading the dataset. I selected all African countries, with the exception of Morocco, Algeria, Tunisia, Libya, Egypt and The Sudan, which are not considered to be sub-Saharan African countries following the definition by the UN (United Nations, n.d.). When filtering all the other disasters from the database, 89 entries remain for the period of 01-01-2010 until 01-04-2022. To select 35 cases out of all the eligible entries, I used a random number generator provided by Google (Google, 2022). The initial 35 cases were not as diverse as possible in terms of conditions (e.g. some relatively small countries with relatively insignificant droughts had more than four entries, while other bigger countries were left out entirely), so I opted to substitute those for other

cases, making sure that my sample was as diverse as possible. Since smaller countries with relatively minor droughts can still be of great substantial interest, I chose to include those as well. However, this meant that my initial number of 35 cases was too narrow to include both a considerable amount of variation between the cases as well as all the 'important', significant droughts that were relatively impactful. That is why I chose to include the Ethiopian drought of 2015-2017 and the Kenyan drought of 2019 by hand. These droughts affected 10200000 and 2600000 people respectively (EM-DAT, 2008), which is a considerable amount compared to the other cases, and would be left out completely if I did not intervene. The result is a sample of 37 cases that share the same baseline characteristics, while still being as diverse as possible in terms of conditions. The remaining 37 cases are located in Somalia, Djibouti, Mauritania, Tanzania, Cameroon, Malawi, Senegal, Burkina Faso, The Gambia, South Sudan, South Africa, Ethiopia, Chad, Cabo Verde, Madagascar, Namibia, Kenya, Botswana, eSwatini, Lesotho, Mali, Mozambique, Niger, Angola, Zambia, and Zimbabwe.

3.3 Condition sources and calibrations

3.3.1 Unrest

I use the ACLED definition of political unrest. ACLED is a registered non-profit that collects the dates, actors, locations, fatalities, and types of all documented political violence and protest events across the world (Raleigh et al., 2010). Research on local level elements and the dynamics of civil and communal conflict is possible using ACLED. Because subnational conflict research accounts for just roughly 15% of all conflict scenarios worldwide, ACLED challenges findings from bigger national-level studies (ibid.). As mentioned before, ACLED defines political unrest as (non-violent) demonstrations for political causes (Raleigh et al., 2010). Political causes specifically refer to opposition against or demands for policies, laws, governance practices or regulations (ibid.). I solely focus on events categorized as 'riots' or 'protests' (Raleigh et al., 2010). If the ACLED events specifically refer to 'drought' in the database, I consider them to be drought-related political unrest. In addition to this, I consider the ACLED events to be drought-related political unrest if they specifically refer to 'water shortage' in their description, but only if EM-DAT shows that their exact locations experienced drought at the time of the event. Following this method, 11 of my 37 cases are coded to having experienced drought-related unrest. This means that about 30% of my cases are coded with the outcome 'unrest = 1', which corresponds with current best practices in the field (see e.g. Ide et al., 2020a; Ide et al., 2020b).

3.3.2 Drought duration

Besides location, EM-DAT logically provides information on the duration of the drought. Out of the 37 selected cases, the drought duration ranges from 1 month up to 36 months. I calibrated my droughts to be long-lasting (drought duration = 1) if they last longer than 9 months. This is motivated by both empirics and theory. In my data, the median drought duration is 9 months, meaning that any drought that lasted longer than 9 months are considered to be relatively long-lasting. In addition to this, any drought lasting less than 10 months is considered to be a short-term or medium-term drought in most meteorology papers (see e.g. Botai et al., 2016; Halwatura et al., 2015). Admittedly, although it is theory-based, this cutoff-point is still somewhat arbitrary, as other researchers use different margins. Some authors use 12 months as a minimum for a long-lasting drought (see e.g. Elhagib & Elhag, 2011), while others consider droughts to be long-lasting if they last longer than 6 months (National Integrated Drought Information System, n.d.). Having to calibrate variables in either 'present' or

‘absent’ is one of the major drawbacks of this method and it shows in particular with ratio-data like drought-duration.

3.3.3 Number of people affected

In addition to the location and duration of disasters, EM-DAT also provides data of the amount of people that are affected by the disaster (EM-DAT, 2008). Affected people are defined as people requiring urgent assistance during a period of crisis (ibid.). Urgent assistance can be basic survival needs such as food, water, shelter, sanitation and/or immediate medical assistance (ibid.). I choose to use the EM-DAT figures rather than data from another source, because it allows me to be sure of the fact that the number of people that are affected are confined to the exact locations EM-DAT uses. Other datasets might use slightly different locations for drought occurrence, meaning that they might also have a different number for affected people, since they may include/exclude people based on their drought-geolocations. Using EM-DAT bypasses this problem entirely.

3.3.4 Population

The population data that I use in this thesis is provided by The World Bank (The World Bank, 2022a). The data comes from national population estimates and census statistics released by each country's national statistical agency (ibid.). If the drought lasted for less than a year, I used the population data for the year the drought occurred in. If the drought lasted longer than one year, I took the average of the population scores for the entire drought period. This means that there is a possibility that my population data is somewhat off for longer-lasting droughts. However, it should not deviate significantly from reality and can therefore still be used for the purpose of this thesis.

3.3.5 Impact

As mentioned before, because of data unavailability, I chose to compute my own variable for heavy impact. My variable for impact measures how many people are affected, corrected for the size of the community; the reasoning behind this correction is that otherwise larger communities will inevitably get a higher score on this variable, even though they might not be particularly affected by a drought. This generated number is then divided by the duration of the drought to assess the severity of the drought. The reasoning behind this is that logically, the longer a drought lasts, the more people will inevitably be affected. If I would choose to not correct for this, the new variable would overlap too much with the factor ‘drought duration’, which would mean that including it would be redundant. However, following the literature, there is reason to believe that the severity of the drought has a causal link with political unrest (Gawronski & Olson, 2013; Ide et al., 2020a). I therefore choose to include this condition in my model, albeit in a slightly altered form. Droughts are considered to be relatively impactful (heavy impact = 1) if the computed variable has a score of above 0.10. This means that 7 of my 37 cases are considered to be of heavy impact. This calibration is purely driven by the fact that it is a round number and the fact that any case that is above 0.10 stands out from the rest, as the average number is 0.05. Since no other researchers have used this variable before, I have to resort to a somewhat subjective calibration. One could just as well argue that another calibration is more suitable, but since the usage of this variable is provisional, I opted to use a round number that stands out from the data as a cut-off point.

3.3.6 Season

To determine the agricultural season the drought occurred in, I use the Global Information and Early Warning System (GIEWS) country briefs by Food and Agriculture Organization of the United Nations (FAO, n.d.). The Country Briefs provide information on the agricultural seasons in a country, harvest prospects for the key staple food crops, and livestock conditions (ibid.). Cases are calibrated to 'season = 1' if the peak of the drought occurred in the growing season of at least one national staple food crops. The drought peaks are analyzed by using the Standardized Precipitation-Evapotranspiration Index (SPEI) Global Drought Monitor. This drought monitor can determine the severity of a drought based on its intensity and length, as well as the start and end of drought events. Because it can be estimated over a wide range of climates, the SPEI enables for comparisons of drought severity through time and space (Vicente-Serrano, Beguería, & López-Moreno, 2010). Following this method, 15 of the 37 cases are considered to be affected in the growing season.

3.3.7 Agricultural dependence

To decide whether a country is agriculture-dependent, I use the graph provided by Von Uexkull et al. (2016). This graph uses data by the Uppsala Conflict Data Program (UCDP) and shows the agricultural dependence by ethnic group settlement area and ranges from 0.00 to 0.99 (Von Uexkull et al., 2016). Following the definition by the UCDP, communities are considered to be agriculture-dependent (agricultural dependence = 1) if more than 70% of their settlement area is covered by cropland (ibid.). This means that 15 of the 37 cases are considered to be agriculture-dependent.

3.3.8 Cleavage

As an indicator for cleavages, I calibrated whether politicized social or cultural lines existed within a community prior to or during the drought. I did so based on qualitative information for each individual case. The information is collected from academic journals, news articles and specific country reports, such as the Bertelsmann Transformation Index Project (BTI, n.d.) and the World Inequality Database (WID, 2022). If there are politicized social or cultural lines present at the onset of the drought, I consider them to have political cleavages (cleavage = 1). This results in 22 of the 37 having political cleavages at the time of the drought.

3.3.9 Ethnopolitical exclusion

To determine if the affected community experiences ethnopolitical exclusion, I use the Ethnic Power Relations (EPR) Core Dataset (Vogt et al., 2015). It provides annual data on politically significant ethnic groups, their respective population sizes, and their access to executive government power (ibid.). The data is calibrated as 'ethnopolitical exclusion = 0' if the affected group rules alone, if the representatives of the group participate as (senior) partners in a power-sharing arrangement or if ethnicity is not politicized. The data is calibrated as 'ethnopolitical exclusion = 1' if elite representatives of the affected community hold no executive political power or if group members are subjected to intentional and targeted discrimination by the state. Following this definition, only 3 of the 37 are calibrated as 'ethnopolitical exclusion = 1'. This is because I used a relatively narrow definition for affected groups. It is perfectly possible that ethnopolitically excluded people are affected in more than three of my 37 cases, it is just that they were not the predominant ethnopolitical group in the affected community. This means that the calibration of this variable is likely to be a false

negative. However, due to time constraints and because of the scope of this thesis, I still choose to use this dataset rather than doing an in-depth ethnopolitical analysis of each case.

3.3.10 Democratic regime

To assess whether the affected community lives in a democracy or autocracy, I primarily use data from the Democracy Index by the Economist Intelligence Group (Economist Intelligence Unit, 2022). The Democracy Index assigns scores to countries measuring different facets of democracy and distributes them in one of four categories: full democracies, flawed democracies, hybrid regimes, and authoritarian regimes (ibid.). Following these categories, I calibrated countries as 'democracy = 1' if they were regarded as full or flawed democracies at the time of the drought. In practice, this means that only flawed democracies were calibrated as being a democracy, as there were no full democracies in my dataset (ibid.). For the remaining 5 cases that were not covered by the Democracy Index, I used indicators by Freedom House, which roughly correspond with those made by the Economist Intelligence Unit (Freedom House, 2022). This did not make that much of a difference, as none of the 5 remaining cases were considered to be borderline cases, but were full-fledged autocracies (ibid.). This means that 8 of the 37 cases are calibrated as being a democracy.

3.3.11 IMR

For the Infant Mortality Rate, I used data provided by the World Bank. IMR is the probability of deaths of children under the age of one, per 1000 live births (The World Bank, 2022b). The IMR is calibrated as 'socioeconomic development = 1' if the IMR is higher than 42.5, which is the border case of the upper quadrant in world rankings in IMR. This means that the 16 calibrated countries (socioeconomic development = 1) score significantly worse than other countries in the world, which means that their socioeconomic development is substantially low.

3.4 Software used

In this thesis, I used the program FsQCA version 3.0. FsQCA is co-developed by Charles Ragin himself (2009) and is considered to be the most commonly used software for QCA analyses (Thiem & Duşa, 2013). FsQCA can be used for all major analytic steps, which is both a reliable and convenient to go about doing a QCA analysis, as doing the analysis manually can be particularly time consuming (Ragin, 2017). Although FsQCA stands for fuzzy sets, the program allows for both crisp-sets and fuzzy-sets (ibid.). FsQCA allows for the uploading of a data matrix, which it automatically transforms in a truth table, which it then minimizes following the logical minimization method. In the analysis I will go deeper into the outcome and solutions provided by the software.

4. Results

In this chapter, the results of the analysis will be discussed. I will start with an analysis of the necessary conditions. A condition can be regarded as necessary if its consistency score is higher than 0.90 (Schneider & Wagemann, 2010). Consistency scores range from 0.00, which indicates that in none of the cases the condition is present when the outcome is present, to 1.00, which implies that in all the cases where the condition is present, the outcome is present as well. The consistency scores for each condition can be found in Table 1. None of the conditions pass the 0.90 consistency threshold, with drought duration (0.64), season (0.64), agricultural dependence (0.64) and pre-existing cleavages (0.73) scoring highest. This means that none of the conditions can be considered necessary for the outcome.

Table 1

Consistency scores conditions

Condition	Consistency
Drought duration	0.636364
Impact	0.090909
Season	0.636364
Agricultural dependence	0.636364
Pre-existing cleavages	0.727273
Ethnopolitical exclusion	0.090909
Democratic regime (absence)	0.344828
Socioeconomic development	0.454545

The analysis of sufficient conditions can draw on different kind of 'solutions' (different ways to minimize the truth tables), all of which are provided by FsQCA 3.0: the complex, parsimonious and intermediate solution. The complex solution makes no assumptions about logical remainders, the parsimonious solution uses all simplifying assumptions, and the intermediate solution is somewhat in between the former two solutions and uses only easy counterfactuals (Schneider & Wagemann, 2012, p. 175). In accordance with the standards of good research, all the solutions, their corresponding parameters of fit and the cases that are covered by each solution term are provided in Table 2.

Table 2

FsQCA findings: all solutions

	raw coverage	unique coverage	consistency	cases covered
Complex solution				
DROUGHT DURATION*impact*AGRICULTURAL DEPENDENCE*CLEAVAGE*ethnopolitical exclusion*democratic regime*socioeconomic development	0.272727	0.272727	1.00	13, 34, 37
drought duration*impact*season*agricultural dependence*cleavage*ethnopolitical exclusion*democratic regime*SOCIOECONOMIC DEVELOPMENT	0.090909	0.090909	1.00	24

drought duration*impact*SEASON*AGRICULTURAL DEPENDENCE*cleavage*ethnopolitical exclusion*democratic regime*socioeconomic development	0.090909	0.090909	1.00	7
DROUGHT DURATION*impact*season*agricultural dependence*CLEAVAGE*ethnopolitical exclusion*democratic regime*SOCIOECONOMIC DEVELOPMENT	0.181818	0.181818	1.00	1, 14
drought duration*impact*SEASON*AGRICULTURAL DEPENDENCE*CLEAVAGE*ethnopolitical exclusion*democratic regime*SOCIOECONOMIC DEVELOPMENT	0.090909	0.090909	1.00	10
drought duration*IMPACT*SEASON*AGRICULTURAL DEPENDENCE*CLEAVAGE*ethnopolitical exclusion*DEMOCRATIC REGIME*socioeconomic development	0.090909	0.090909	1.00	33
DROUGHT DURATION*impact*SEASON*AGRICULTURAL DEPENDENCE*CLEAVAGE*ETHNOPOLITICAL EXCLUSION*democratic regime*SOCIOECONOMIC DEVELOPMENT	0.090909	0.090909	1.00	19

Solution coverage	0.909091
Solution consistency	1.00

	raw coverage	unique coverage	consistency	cases covered
Parsimonious solution				
season*cleavage*SOCIOECONOMIC DEVELOPMENT	0.090909	0.090909	1.00	24
DROUGHT DURATION*season*CLEAVAGE*ethnopolitical exclusion*democratic regime	0.272727	0.181818	1.00	1, 14, 37
IMPACT*SEASON*socioeconomic development	0.090909	0.090909	1.00	33
DROUGHT DURATION*AGRICULTURAL DEPENDENCE*democratic regime	0.363636	0.181818	1.00	13, 19, 34, 37
SEASON*AGRICULTURAL DEPENDENCE*cleavage*socioeconomic development	0.090909	0.090909	1.00	7
SEASON*AGRICULTURAL DEPENDENCE*CLEAVAGE*democratic regime*SOCIOECONOMIC DEVELOPMENT	0.181818	0.090909	1.00	10, 19

Solution coverage	0.909091
Solution consistency	1.00
Intermediate solution	

	raw coverage	unique coverage	consistency	cases covered
season*cleavage*democratic regime*SOCIOECONOMIC DEVELOPMENT	0.090909	0.090909	1.00	24
DROUGHT DURATION*AGRICULTURAL DEPENDENCE*CLEAVAGE*democratic regime	0.272727	0.181818	1.00	1, 14, 37
SEASON*AGRICULTURAL DEPENDENCE*cleavage*democratic regime*socioeconomic development	0.090909	0.090909	1.00	33
DROUGHT DURATION*season*ethnopolitical exclusion*democratic regime*SOCIOECONOMIC DEVELOPMENT	0.363636	0.181818	1.00	13, 19, 34, 37
SEASON*AGRICULTURAL DEPENDENCE*cleavage*socioeconomic development	0.090909	0.090909	1.00	7
SEASON*AGRICULTURAL DEPENDENCE*CLEAVAGE*democratic regime*SOCIOECONOMIC DEVELOPMENT	0.181818	0.090909	1.00	10, 19

Solution coverage	0.909091
Solution consistency	1.00

Although all solutions need to be presented, discussing them all would be considered too time consuming (Schneider & Wagemann, 2012, p. 175). Schneider & Wagemann argue that the intermediate solution strikes an adequate balance between the complex and parsimonious solution, as "the [complex] solution often tends to be too complex to be interpreted in a theoretically meaningful or plausible manner, [while] the parsimonious solution risks resting on assumptions about logical remainders that contradict theoretical expectations, common sense, or both" (Schneider & Wagemann, 2017, p. 175). However, others contradict these claims and say that while all solutions can be appropriate in different circumstances, only the parsimonious solution can be used to make causal inferences (see e.g. Toshkov, 2017). The best way to determine what solution is best to discuss is to opt for the simplest possible solution, with the highest possible consistency (Pappas & Woodside, 2021, p. 12). In other words, sometimes it is better to choose the intermediate solution if it has a better solution consistency. However, if the solution consistency is not better in the intermediate solution than in the parsimonious solution (as is the case here), it is better to select the most uncomplex solution (ibid.). That is why I will only discuss the parsimonious solution. The equation of this solution is as follows:

SEASON*AGRICULTURAL DEPENDENCE*CLEAVAGE*democratic regime*SOCIOECONOMIC DEVELOPMENT +
DROUGHT DURATION*AGRICULTURAL DEPENDENCE*democratic regime +
DROUGHT DURATION*season*CLEAVAGE*ethnopolitical exclusion*democratic regime +
season*cleavage*SOCIOECONOMIC DEVELOPMENT +
SEASON*AGRICULTURAL DEPENDENCE*cleavage*socioeconomic development +
IMPACT*SEASON*socioeconomic development → UNREST

Since Boolean algebra can be somewhat difficult to interpret, I provided a more visual way of noting the different solution terms in Table 3.

Table 3

FsQCA findings: parsimonious solution

	Solution					
Configuration	1	2	3	4	5	6
Drought duration		●	●			
Impact					●	
Season	●		×	●	●	×
Agricultural dependence	●	●		●		
Pre-existing cleavages	●		●	×		×
Ethnopolitical exclusion			×			
Democratic regime	×	×	×			
Low socioeconomic development	●			×	×	●
Consistency	1	1	1	1	1	1
Raw coverage	0.181818	0.363636	0.272727	0.090909	0.090909	0.090909
Unique coverage	0.090909	0.181818	0.181818	0.090909	0.090909	0.090909

Solution coverage	0.909091
Solution consistency	1.00
Cases covered with solution	1, 7, 10, 13, 14, 19, 24, 33, 34, 37

Note: Black circles (●) indicate the presence of a condition, and a cross (×) indicate its absence. Blank spaces indicate that a condition does not matter in this configuration of conditions.

The fsQCA findings as presented in Table 3 are readable as follows: For non-democracies in sub-Saharan Africa, the combination of a drought happening in a growing season, affecting an agriculture-dependent community, that has pre-existing cleavages and a low socioeconomic development (**solution 1**), or the combination of a relatively long-lasting drought affecting an agriculture-dependent community (**solution 2**), or the combination of a relatively long-lasting drought happening outside the growing season affecting a community that has pre-existing cleavages, but no ethnopolitical exclusion (**solution 3**) can lead to political unrest. For countries in sub-Saharan Africa with a relatively high socioeconomic development, the combination of a drought happening in a growing season, affecting an agriculture-dependent community that has no pre-existing cleavages (**solution 4**), or the combination of a drought having a heavy impact and happening in a growing

season (**solution 5**) can lead to political unrest. For communities that are affected by the drought outside of the growing season and have no pre-existing cleavages, having a low-socioeconomic development can cause the droughts to result in political unrest (**solution 6**).

The consistency score of 1.00 indicates that the solution is free of contradictions. In other words, in all cases where the combination of conditions is present, the outcome is present as well. The coverage score of 0.91 indicates that 10 out of 11 unrest cases are covered by the solution. The only unrest case that is not covered by the solution is case number 25: the drought-related unrest in Madagascar in October 2020. The only present conditions in this case are drought duration and season. It shares this configuration with two other cases: the Madagascar drought of 2017-2018 and the Angolan drought of 2020-2022. In the discussion chapter of this thesis, I will go into deeper detail on this particular outlier, the reason why this configuration has conflicting results and if necessary I will try to come up with alternative pathways.

5. Discussion

5.1 Solution vis-à-vis theory

To give meaning to the solution provided by FsQCA, I will go over the theorized conditions and discuss how the solution relates to their specific theoretical predictions.

A **longer lasting drought** increases the likelihood of people losing access to valuable assets such as water, because they might use up reserves that would have sufficed if the drought duration was shorter. In addition to this, the longer economic productivity declines because of a drought, the less likely it is that state agencies have the ability to cope with the consequences of drought, which in turn could cause resentment to grow (Helman et al., 2020). However, a long-lasting drought alone seems neither a necessary nor a sufficient condition for the onset of drought-related political unrest. Additional factors, such as agricultural dependence or pre-existing cleavages, in combination with being a non-democracy, must be present concurrently to generate resentment of sufficient magnitude to cause unrest. Theoretically, both configurations would make sense. In the first of the aforementioned solution terms (DROUGHT DURATION*AGRICULTURAL DEPENDENCE*democratic regime), being **agriculturally dependent** increases the likelihood that a longer drought duration significantly impacts one's livelihood, as a longer-lasting drought increases the chances that, for example, one's crops fail. If there is no formal way to voice these concerns (when **living in a non-democracy**), protests or riots may seem like a viable alternative for affected people.

The second solution term (DROUGHT DURATION*season*CLEAVAGE*ethnopolitical exclusion*democratic regime) is convincing, as there need to be certain grievances (such as pre-existing cleavages or not living in a democracy) in order for the causal effect of a longer lasting drought, namely exposing grievances, to come into effect. The absence of **ethnopolitical exclusion**, however, is remarkable. Ethnopolitical exclusion is only relevant in this specific solution term, and the fact that it is only relevant when absent is peculiar, especially since Von Uexkull et al. (2016) find that it is the most salient driver of conflict.

Realistically speaking, there are two possible reasons why my solution is incongruent with the findings by Von Uexkull et al. (2016). The first reason is that my calibrations could be off and that I need to reassess which people truly were affected by a drought and whether they are excluded from the political system based on their ethnicity. It is possible that I used a definition of ethnopolitical exclusion that is too narrow, as is discussed in my methods chapter (paragraph '3.3.9 Ethnopolitical exclusion'), which could lead to a false negative. Therefore, the EPR Core Dataset might not suffice and perhaps evaluating whether a people is ethnopolitically excluded should be assessed in a more in-depth matter. However, as this is a Herculean task – it would require me to assess each of the 37 droughts on a gridded map and determine a) what people live in each cell and b) evaluate whether and to what degree they are excluded from political power based on their ethnicity – this falls outside of the scope of this Master's thesis. The second reason could be that ethnopolitical exclusion is only a salient driver of conflict in a large scale, violent conflict, but not in political unrest. As Von Uexkull et al. say, most violent civil conflicts are fought along ethnic lines, as ethnicity 'is a key element necessary to solve the collective action problem for mobilization' (Von Uexkull et al., 2016, p. 12391). It could be possible that the same collective action problem does not exist for political unrest, or that this is 'solved' by other conditions, which would make ethnopolitical exclusion

superabundant. Moreover, De Juan & Hänze (2020) find that scarcity does not foster intergroup polarization, but rather that joint exposure to existential threats such as drought-induced scarcity improves intergroup relations (De Juan & Hänze, 2020, pp. 152-153). In that sense, the fact that ethnopolitical exclusion is only relevant when absent is consistent with other empirical findings.

The solution identifies that **impact**, although alone not necessary nor sufficient, is a relevant condition for the onset of drought-related political unrest, but only if the drought occurs during the growing season, in countries with a relatively high socioeconomic development (IMPACT*SEASON*socioeconomic development). The fact that a heavy impact is only salient when the drought peaks during the growing season is plausible, as both conditions jointly can significantly worsen one's living conditions. Following theoretical claims by Gawronski & Olson (2013) and Ide et al. (2020a), more severe grievances generate a stronger support for affected communities, which may result in a larger group of people willing to participate in protests. It is not entirely clear why this configuration is only true in countries with a relatively high **socioeconomic development**. Another solution term that specifically requires both a relatively high socioeconomic development and being affected during the growing season is 'SEASON*AGRICULTURAL DEPENDENCE*cleavage*socioeconomic development'. Linke & Ruether (2021) state that droughts have the strongest relationship with conflict during **growing season**, as this is the time where farming households suffer the greatest income losses.

Although the relationship between having a relatively high socioeconomic development and being affected during growing season is unclear, one could suspect that if one lives in a relatively wealthy country, and there are vast drought-induced income losses, the difference in socioeconomic standing between a household that is affected versus a household that is less directly troubled and might still have its relatively high socioeconomic position could lead to amplified grievances, which ultimately could be the reason for people to protest to voice their resentment. This is in line with the reasoning by Tarkhani (2021), who states that people only resort to disruption of existing social and political practices when they are aware of their (relatively) poor economic conditions. In other words, heavy drought impact and being affected during growing season might be especially salient in relatively wealthy countries, because it has the possibility to accentuate differences between people that are agriculturally dependent and people that are less directly affected by a drought.

For countries with a relatively low socioeconomic development, FsQCA gives two vastly different configurations: both 'SEASON*AGRICULTURAL DEPENDENCE*CLEAVAGE*democratic regime*SOCIOECONOMIC DEVELOPMENT' and 'season*cleavage*SOCIOECONOMIC DEVELOPMENT'. Following the theory, the first of the two solution terms makes the most sense. Countries with a low socioeconomic development might not have the right irrigation infrastructure, institutions that manage resource use and/or food security and poverty reduction programs (Linke & Ruether, 2021). This alone, however, seems neither necessary nor sufficient, as additional factors such as being agriculturally dependent and being affected during the growing season, having pre-existing cleavages and living in a non-democracy must be present simultaneously. One could argue that, for instance, the absence of well-functioning irrigation infrastructure or institutions that manage resource use is only relevant when people who are agriculturally dependent are affected during growing season. Alternatively, dire prospects for recovery from a drought because of low-socioeconomic development (Ide et al., 2020a, p. 86) might only be relevant for unrest-onset when

there are salient identities to rally around in order to mobilize enough people for a protest (De Juan & Hänze, 2020, p. 151). However, the second solution term shows that the *absence* of cleavages can also be required factor in a configuration. These contradictory solution terms may seem confusing at first, but when looking deeper into them, there might be a logical explanation for them: **Cleavages** have to be present when an agriculturally dependent community is affected by a drought during a growing season, as this combination of factors can accentuate the difference between the 'haves' and the 'have-nots', while the drought occurring outside of the growing season does not necessarily accentuate these differences. Instead, all people are affected to a relatively similar degree. This joint exposure can create a shared sense of resentment which in turn might solve the mobilization problem for collective action, as improved intergroup relations might mean that there is a larger group of people that are willing to protest.

5.2 Deviant case: Madagascar unrest

Discussing deviant cases regarding coverage (i.e. cases where there was political unrest, but that were not explained by the QCA solution) and regarding consistency (i.e. non-unrest cases that were covered by the QCA solution) is considered to be a useful way to identify missing conditions, potential calibration errors and objectives for future research (Ide et al., 2020b). Since the consistency score is 1.00, there are no non-unrest cases that were covered by the QCA solution, which means that I will only look into the one deviant case regarding coverage: the political unrest in Madagascar in October 2020 (hereafter: the Madagascar unrest).

As said in the results, the Madagascar unrest is characterized by a relatively long drought happening in a non-democracy, with the drought occurring during the growing season of one of the staple food crops (wheat). The Madagascar unrest can be considered an extremely low-intensity conflict, even in the context of my sample: only 15 people were participating in the demonstration and expressed concerns about the drought and hunger their people are facing. While ACLED does not always provide exact numbers, the bulk of the cases usually describe something along the lines of 'dozens' or 'hundreds or people' protesting. Hence, it is possible that for political unrest of that scale, agricultural dependence and pre-existing cleavages (solution 1) or heavy impact (solution 5) are not essential conditions. In other words, mobilizing such a small group of people is less dependent on other contextual factors, and is perhaps just as easily not done, as seen in the cases that share their configuration with the Madagascar unrest: it is entirely possible that in these cases (the Madagascar drought of 2017-2018 and the Angolan drought of 2020-2022) people wanted to mobilize a (small) group of people, but for one reason or the other did not bother. However, I have no empirical proof to substantiate these claims, so it might be useful to look into alternative reasons why the Madagascar unrest did experience (small-scale) political unrest, while the Madagascar drought of 2017-2018 and the Angolan drought of 2020-2022 did not.

Before delving into the differences between the Madagascar drought of 2017-2018 and 2020-2021, it is first interesting to look into what differentiates Angola from Madagascar and why the same set of my eight conditions might lead to a small-scale protest in Madagascar, while that did not happen in Angola. The main difference regarding agricultural security between Angola and Madagascar is the difference in total area equipped to provide water via irrigation: 86 thousand hectares in Angola versus a little more than one thousand hectares or area equipped for irrigation in Madagascar (Knoema, 2021a; Knoema, 2021b). Corrected for the size of the countries, this means that Angola has more

than 37 times as much land area that is equipped for irrigation as Madagascar (ibid.; ibid.). Well-functioning irrigation infrastructure is known to be able to prevent drought-induced conflict onset for violent conflicts (Burke et al., 2009, p. 20674; Linke & Ruether, 2021, p. 115). The fact that the Madagascar drought of 2020-2021 did lead to small scale political unrest, while the Angolan drought of 2020-2022 did not, might very well correlate with the available irrigation infrastructure in the respective lands. This means that the presence or absence of irrigation infrastructure could also be a deciding factor for political unrest, which would mean that it is an omitted condition in this thesis. Irrigation infrastructure was one of the dimensions I tried to measure with socioeconomic development. However, the usage of IMR as a proxy for this particular dimension might not be as relevant, as Angola and Madagascar are both calibrated for having a relatively low socioeconomic development in terms of IMR, while there are significant differences in irrigation infrastructure between the two countries. Computing a separate condition for irrigation infrastructure is therefore recommended in future research.

There are, of course, other contextual factors that could be influential: Angola experienced a reduction in inflation during the drought. In addition to this, Angola has experienced increased purchasing power for consumers, which in turn allowed the government to reduce the cost of imported goods (UNOCHA, 2022). This turn of events might have led to a (temporary) suppression of drought-related grievances for the Angolan people, which means that there was a less pressing need to protest to raise awareness for the drought. Both of these contextual factors are not mutually exclusive: there is good reason to believe that, just like all other figurations, there is a complex conjunction of contextual conditions that influences whether a non-violent conflict occurs or not.

The difference between the Madagascar drought of 2017-2018 and 2020-2021 is less straight forward, as both droughts occurred in the same country in a relatively short timeframe. This means that, normally speaking, there would not be enough time between the drought for structural conditions to change all that much. There is, however, one deciding factor that drastically changed Madagascar's economic landscape between 2017-2018 and 2020-2021: the COVID-19 pandemic. Prior to the pandemic, Madagascar's economy was seeing 'an economic boom', with a growth rate of 4.9 percent in 2019, the highest in almost a decade (Philipp, 2021). The economic progress was largely due to an increase in export activity (ibid.). COVID-19 has restricted global trade and hindered Madagascar's major industries, such as tourism, which sent the country into a sudden recession with a GDP deflation of minus 4.2 percent (ibid.). Synchronal to the pandemic, there has been a relatively long-lasting drought with all its consequences, which could accentuate the economic grievances. The combination of these factors could very well have led to feelings of desperation among certain citizens, leading to the small-scale protest we have seen. This could explain why the 2017-2018 drought did not lead to (small-scale) protest(s) in Madagascar, while the 2020-2021 drought did.

Overall, the analysis of the deviant case supports the results of the main analysis, as the Madagascar unrest can be considered an exceptional case, because of its very low intensity and its simultaneous occurrence with the COVID-19 pandemic. However, the potential relevance of well-functioning irrigation infrastructure for conflict prevention highlights the need to pay additional attention to this factor in future research.

6. Conclusion

In this thesis, I tried to unravel the pathways to drought-related political unrest. Since most environmental security research focuses on large-scale, violent conflicts, this thesis fills a significant gap in the existing literature. Even though political unrest is relatively understudied, it is still important to analyze them, as they can be a driver of social change, an indicator of lurking grievances or could be a starting point of violent conflict (Ide et al., 2020b).

In line with my theoretical predictions, these findings show that the onset of drought-related political unrest is dependent on a complex combination of contextual conditions, which means that answering the guiding research question *'Under what conditions can droughts lead to political unrest in sub-Saharan Africa?'* leads to a non-straightforward answer.

My findings show that for **non-democracies in sub-Saharan Africa**, the combination of

- a drought happening in a growing season, affecting an agriculture-dependent community, that has pre-existing cleavages and a low socioeconomic development, or;
- the combination a relatively long-lasting drought affecting an agriculture-dependent community, or;
- the combination of a relatively long-lasting drought happening outside the growing season affecting a community that has pre-existing cleavages, but no ethnopolitical exclusion …

… can lead to political unrest.

For **countries in sub-Saharan Africa with a relatively high socioeconomic development**, the combination of

- a drought happening in a growing season, affecting an agriculture-dependent community that has no pre-existing cleavages, or;
- the combination of a drought having a heavy impact and happening in a growing season …

… can lead to political unrest.

For communities that are affected by the drought **outside of the growing season and have no pre-existing cleavages**, having a low-socioeconomic development can cause the droughts to result in political unrest.

This thesis contributes to wider environment security debates in a number of ways. First, as shown above, my results support the researchers that reject determinist linkages between extreme weather and conflict (see Barnett, 2018; Gleditsch, 2020); the onset of drought-induced political unrest is highly dependent on a combination of specific contextual factors. The fact that drought-related political unrest is so dependent on specific contextual factors makes it hard to translate my results into direct policy recommendations. Depending on the specific context, in regions that are regularly affected by droughts, development workers and politicians could try to make inhabitants less reliant on agriculture for their livelihoods, or alternatively, should look into ways communities are less reliant on rainwater by implementing modern irrigation infrastructure or institutions that manage water use.

Second, I add to the literature on low-intensity conflicts. For some contextual factors, such as ethnopolitical exclusion, my results differ vastly from established research findings for violent civil conflict (see Von Uexkull et al., 2016). This shows that there is a substantial difference between political unrest and larger, violent conflict and that findings for violent conflict cannot be simply extrapolated to all kinds of conflict.

Third, I have shown how my method, QCA, can be employed to bridge the qualitative-quantitative barrier in environmental security research (Ide, 2017). I utilized a medium number of cases and combined data on the national level (such as on regime type), the local level (such as on the agricultural season of the affected area), as well as qualitative (such as on pre-existing cleavages) and quantitative information (such as drought impact). Moreover, the QCA has proven itself to be a useful tool to unravel the complex configurations of conditions, which has helped proving the point that climate-conflict-links are non-deterministic.

Several unanswered questions and blind spots remain. The most obvious weak point of the study of political unrest is that it might be underreported in comparison to large-scale civil conflict, especially in authoritarian countries. Whereas it would be difficult to conceal conflict with multiple deaths, it would be relatively easy for a country to cover up small-scale protests, in particular in countries where a regime does not allow free press. It could be the case that there have been significantly more cases of political unrest than are presented in the ACLED database, but that the outside world just does not know of. This underreporting in non-democracies could lead to skewed results and might, therefore, incorrectly influence our understanding of the contexts in which droughts lead to political unrest. A way to bypass this might be through longitudinal, in-depth qualitative field work where a researcher herself might see political unrest with her own eyes.

In addition to this, the deviant case shows that (well-functioning) irrigation infrastructure might be an omitted condition in this thesis. Barring local (idiosyncratic) conditions, there should be no structural contextual difference between the Angolan drought of 2020-2022 and the Madagascar drought of 2020-2021 based on the calibration of my eight conditions. The first, however, did not lead to political unrest, while the latter did. As discussed in the previous chapter, the answer might lie in the difference in irrigation infrastructure. I would recommend future research to look into this structural condition, as this might help in further shaping our understanding of drought-related conflict onset.

Moreover, the Madagascar unrest shows that COVID-19 might also be an influential factor in drought-related political unrest. Even though the Coronavirus disease is not a structural factor, it could very well be the case that the pandemic accentuated underlying (economic) grievances, which could be the difference between conflict-onset and situations where citizens felt less of a need to protest or riot, as seen in the difference between the Madagascar drought of 2017-2018 and 2020-2021. It would be useful to look deeper into the influence of the pandemic in future research, as this might explain conflict onset in recent years.

Apart from these blind spots, I believe that my research can be a valuable contribution to the existing knowledge on climate change related conflict. Even though the onset of drought-induced political unrest is highly dependent on specific contextual factors, I believe that extensive knowledge on the matter can be translated into evidence-based tools for decisionmakers. This can be used to design

conflict-sensitive policies for a future that is likely to be characterized by more climate-related disasters.

References

Adano, W. R., Dietz, T., Witsenburg, K., & Zaal, F. (2012). Climate change, violent conflict and local institutions in Kenya's drylands. *Journal of Peace Research*, *49*(1), 65–80. https://doi.org/10.1177/0022343311427344

Barnett, J. (2018). Global environmental change I: Climate resilient peace? *Progress in Human Geography*, *43*(5), 927–936. https://doi.org/10.1177/0309132518798077

Berg-Schlosser, D., De Meur, G., Rihoux, B., & Ragin, C. C. (2009). Qualitative Comparative Analysis (QCA) as an Approach. In B. Rihoux & C. C. Ragin (Eds.), *Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques* (pp. 1–18). SAGE Publications. https://doi.org/10.4135/9781452226569

Botai, C., Botai, J., Dlamini, L., Zwane, N., & Phaduli, E. (2016). Characteristics of Droughts in South Africa: A Case Study of Free State and North West Provinces. *Water*, *8*(10), 1–23. https://doi.org/10.3390/w8100439

BTI. (n.d.). *The Transformation Index*. BTI 2022. Retrieved May 4, 2022, from https://bti-project.org/en/?&cb=00000

Buhaug, H. (2010). Climate not to blame for African civil wars. *Proceedings of the National Academy of Sciences*, *107*(38), 16477–16482. https://doi.org/10.1073/pnas.1005739107

Buhaug, H. (2015). Climate–conflict research: some reflections on the way forward. *WIREs Climate Change*, *6*(3), 269–275. https://doi.org/10.1002/wcc.336

Burke, M. B., Miguel, E., Satyanath, S., Dykema, J. A., & Lobell, D. B. (2009). Warming increases the risk of civil war in Africa. *Proceedings of the National Academy of Sciences*, *106*(49), 20670–20674. https://doi.org/10.1073/pnas.0907998106

De Châtel, F. (2014). The Role of Drought and Climate Change in the Syrian Uprising: Untangling the Triggers of the Revolution. *Middle Eastern Studies*, *50*(4), 521–535. https://doi.org/10.1080/00263206.2013.850076

De Juan, A., & Hänze, N. (2020). Climate and cohesion: The effects of droughts on intra-ethnic and inter-ethnic trust. *Journal of Peace Research*, *58*(1), 151–167. https://doi.org/10.1177/0022343320974096

Döring, S. (2020). Come rain, or come wells: How access to groundwater affects communal violence. *Political Geography*, *76*, 102073. https://doi.org/10.1016/j.polgeo.2019.102073

Economist Intelligence Unit. (2022, April 27). *Democracy Index*. Retrieved June 3, 2022, from https://www.eiu.com/n/

Elagib, N. A., & Elhag, M. M. (2011). Major climate indicators of ongoing drought in Sudan. *Journal of Hydrology*, *409*(3–4), 612–625. https://doi.org/10.1016/j.jhydrol.2011.08.047

EM-DAT (2008). EM-DAT: The International Disaster Database (Available at: \url{http://www.emdat.be/Database/Trends/trends.html})

Gawronski, V. T., & Olson, R. S. (2013). Disasters as Crisis Triggers for Critical Junctures? The 1976 Guatemala Case. *Latin American Politics and Society*, *55*(2), 133–149. https://doi.org/10.1111/j.1548-2456.2013.00196.x

Gleditsch, N. P. (2020). This time is different! Or is it? NeoMalthusians and environmental optimists in the age of climate change. *Journal of Peace Research*, *58*(1), 177–185. https://doi.org/10.1177/0022343320969785

Gleick, P. H. (2014). Water, Drought, Climate Change, and Conflict in Syria. *Weather, Climate, and Society*, *6*(3), 331–340. https://doi.org/10.1175/wcas-d-13-00059.1

Google. (2022). *Google Random Number Generator*. Google LLC. Retrieved May 12, 2022, from https://www.google.com/search?si=AC1wQDDMJZ06TKMWmBkGRSegOhhv8woY90n4wImTZdiONUoUhV3PEFwPomVdAMH8mbUeJJTycEfOQk-jsN_6MviUccpALC7aRvjPN62SRE4oldBNmoLEKjJKL83NgQVPQ4lZ3mgWUU8X&hl=nl-NL&kgs=feface776bac8867&shndl=21&source=sh/x/fbx/1&entrypoint=sh/x/fbx

FAO. (n.d.). *FAO GIEWS Country Briefs-Home*. GIEWS - Global Information and Early Warning System. Retrieved May 9, 2022, from https://www.fao.org/giews/countrybrief/index.jsp

Fjelde, H., & Von Uexkull, N. (2012). Climate triggers: Rainfall anomalies, vulnerability and communal conflict in Sub-Saharan Africa. *Political Geography*, *31*(7), 444–453. https://doi.org/10.1016/j.polgeo.2012.08.004

Freedom House. (2022, June 2). *Expanding freedom and democracy*. Retrieved June 3, 2022, from https://freedomhouse.org/

Halwatura, D., Lechner, A. M., & Arnold, S. (2015). Drought severity–duration–frequency curves: a foundation for risk assessment and planning tool for ecosystem establishment in post-mining landscapes. *Hydrology and Earth System Sciences*, *19*(2), 1069–1091. https://doi.org/10.5194/hess-19-1069-2015

Harari, M., & Ferrara, E. L. (2018). Conflict, Climate, and Cells: A Disaggregated Analysis. *The Review of Economics and Statistics*, *100*(4), 594–608. https://doi.org/10.1162/rest_a_00730

Helman, D., Zaitchik, B. F., & Funk, C. (2020). Climate has contrasting direct and indirect effects on armed conflicts. *Environmental Research Letters*, *15*(10), 104017. https://doi.org/10.1088/1748-9326/aba97d

Hendrix, C. S., & Salehyan, I. (2012). Climate change, rainfall, and social conflict in Africa. *Journal of Peace Research*, *49*(1), 35–50. https://doi.org/10.1177/0022343311426165

Hendrix, C. S., & O'Loughlin, J. (2019, August 12). *In Search of Consensus on Climate-Conflict Links*. New Security Beat. Retrieved June 14, 2022, from https://www.newsecuritybeat.org/2019/08/search-consensus-climate-conflict-links/

Homer-Dixon, T. F. (2001). *Environment, Scarcity, and Violence* (New edition). Amsterdam University Press.

Hsiang, S. M., Burke, M., & Miguel, E. (2013). Quantifying the Influence of Climate on Human Conflict. *Science*, *341*(6151). https://doi.org/10.1126/science.1235367

Ide, T. (2017). Research methods for exploring the links between climate change and conflict. *WIREs Climate Change*, *8*(3), 1–14. https://doi.org/10.1002/wcc.456

Ide, T., Kristensen, A., & Bartusevičius, H. (2020a). First comes the river, then comes the conflict? A qualitative comparative analysis of flood-related political unrest. *Journal of Peace Research*, *58*(1), 83–97. https://doi.org/10.1177/0022343320966783

Ide, T., Lopez, M. R., Fröhlich, C., & Scheffran, J. (2020b). Pathways to water conflict during drought in the MENA region. *Journal of Peace Research*, *58*(3), 568–582. https://doi.org/10.1177/0022343320910777

Knoema. (2021a, July 19). *Angola Total area equipped for irrigation, 1961–2021*. Retrieved June 15, 2022, from https://knoema.com/atlas/Angola/topics/Land-Use/Area/Total-area-equipped-for-irrigation

Knoema. (2021b, July 19). *Madagascar Total area equipped for irrigation, 1961–2021*. Retrieved June 15, 2022, from https://knoema.com/atlas/Madagascar/topics/Land-Use/Area/Total-area-equipped-for-irrigation

Kusa, R., Duda, J., & Suder, M. (2021). Explaining SME performance with fsQCA: The role of entrepreneurial orientation, entrepreneur motivation, and opportunity perception. *Journal of Innovation & Knowledge*, *6*(4), 234–245. https://doi.org/10.1016/j.jik.2021.06.001

Linke, A. M., & Ruether, B. (2021). Weather, wheat, and war: Security implications of climate variability for conflict in Syria. *Journal of Peace Research*, *58*(1), 114–131. https://doi.org/10.1177/0022343320973070

Lipset, S. M. (1959). Some Social Requisites of Democracy: Economic Development and Political Legitimacy. *American Political Science Review*, *53*(1), 69–105. https://doi.org/10.2307/1951731

Olson, R. S., & Drury, A. C. (1997). Un-therapeutic communities: A cross-national analysis of post-disaster political unrest. *International Journal of Mass Emergencies and Disasters*, *15*(2), 221-238.

Mach, K. J., Kraan, C. M., Adger, W. N., Buhaug, H., Burke, M., Fearon, J. D., Field, C. B., Hendrix, C. S., Maystadt, J. F., O'Loughlin, J., Roessler, P., Scheffran, J., Schultz, K. A., & von Uexkull, N. (2019). Climate as a risk factor for armed conflict. *Nature*, *571*(7764), 193–197. https://doi.org/10.1038/s41586-019-1300-6

Mackie, J. L. (1980). Causal Regularities. In *The Cement of the Universe: A Study of Causation (Clarendon Library of Logic and Philosophy)* (pp. 59–87). Clarendon Press.

Maystadt, J. F., Calderone, M., & You, L. (2014). Local warming and violent conflict in North and South Sudan. *Journal of Economic Geography*, *15*(3), 649–671. https://doi.org/10.1093/jeg/lbu033

Maystadt, J. F., & Ecker, O. (2014). Extreme Weather and Civil War: Does Drought Fuel Conflict in Somalia through Livestock Price Shocks? *American Journal of Agricultural Economics*, *96*(4), 1157–1182. https://doi.org/10.1093/ajae/aau010

National Integrated Drought Information System. (n.d.). *Drought Timescales: Short- vs. Long-Term Drought*. Drought.Gov. Retrieved May 3, 2022, from https://www.drought.gov/what-is-drought/drought-timescales-short-vs-long-term-drought#overview

Newell, P., & Bumpus, A. (2012). The Global Political Ecology of the Clean Development Mechanism. *Global Environmental Politics*, *12*(4), 49–67. https://doi.org/10.1162/glep_a_00139

Pappas, I. O., & Woodside, A. G. (2021). Fuzzy-set Qualitative Comparative Analysis (fsQCA): Guidelines for research practice in Information Systems and marketing. *International Journal of Information Management*, *58*, 102310. https://doi.org/10.1016/j.ijinfomgt.2021.102310

Parvin, M. (1973). Economic Determinants of Political Unrest. *Journal of Conflict Resolution*, *17*(2), 271–296. https://doi.org/10.1177/002200277301700205

Pfaff, K. (2020). Assessing the risk of pre-existing grievances in non-democracies: The conditional effect of natural disasters on repression. *International Journal of Disaster Risk Reduction*, *42*, 101337. https://doi.org/10.1016/j.ijdrr.2019.101337

Philipp, J. (2021, July 8). *The Impact of COVID-19 on Poverty in Madagascar*. The Borgen Project. Retrieved June 15, 2022, from https://borgenproject.org/impact-of-covid-19-on-poverty-in-madagascar/

Ragin, C. C. (1987). *The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies*. University of California Press. http://www.jstor.org/stable/10.1525/j.ctt1pnx57

Ragin, C. C. (2009). Qualitative comparative analysis using fuzzy sets (fsQCA). In: Benoît Rihoux & Charles C Ragin (eds.) *Configurational Comparative Methods: Qualitative Comparative Analysis (QCA) and Related Techniques*. Thousand Oaks, CA: Sage, 87–122.

Ragin, C. C. (2017). User's guide to Fuzzy-set / Qualitative Comparative Analysis. Retrieved from: http://www.socsci.uci.edu/~cragin/fsQCA/software.shtml (2 June 2022).

Raleigh, C., Choi, H. J., & Kniveton, D. (2015). The devil is in the details: An investigation of the relationships between conflict, food price and climate across Africa. *Global Environmental Change*, *32*, 187–199. https://doi.org/10.1016/j.gloenvcha.2015.03.005

Raleigh, C., Linke, A., Hegre, H., & Karlsen, J. (2010). Introducing ACLED: An Armed Conflict Location and Event Dataset. *Journal of Peace Research*, *47*(5), 651–660. https://doi.org/10.1177/0022343310378914

Schilling, J., Opiyo, F. E., & Scheffran, J. (2012). Raiding pastoral livelihoods: motives and effects of violent conflict in north-western Kenya. *Pastoralism: Research, Policy and Practice*, *2*(1), 25–46. https://doi.org/10.1186/2041-7136-2-25

Schneider, C. Q., & Wagemann, C. (2010). Standards of Good Practice in Qualitative Comparative Analysis (QCA) and Fuzzy-Sets. *Comparative Sociology*, *9*(3), 397–418. https://doi.org/10.1163/156913210x12493538729793

Schneider, C. Q., & Wagemann, C. (2012). *Set-Theoretic Methods for the Social Sciences: A Guide to Qualitative Comparative Analysis (Strategies for Social Inquiry)* (New ed.). Cambridge University Press.

Sehring, J., Korhonen-Kurki, K., & Brockhaus, M. (2013). Challenges and limitations of QCA. In *Qualitative Comparative Analysis (QCA): An application to compare national REDD+ policy processes* (pp. 17–20). Center for International Forestry Research. http://www.jstor.org/stable/resrep02339.8

Siermann, C. L. J. (1999). Politics, Institutions, and the Economic Performance of Nations. *The Journal of Politics*, *61*(3), 874–876. https://doi.org/10.2307/2647849

Tarkhani, H. (2021). Political Unrest: Factors and Impact. *Encyclopedia of the UN Sustainable Development Goals*, 692–702. https://doi.org/10.1007/978-3-319-95960-3_92

Thiem, A., & Duşa, A. (2013). QCA: A Package for Qualitative Comparative Analysis. *The R Journal*, *5*(1), 87–97. https://doi.org/10.32614/rj-2013-009

The World Bank, World Development Indicators (2022a). *Population, total, Atlas method* [Data file]. Retrieved from https://data.worldbank.org/indicator/SP.POP.TOTL

The World Bank, World Development Indicators (2022b). *Mortality rate, infant, Atlas method* [Data file]. Retrieved from https://data.worldbank.org/indicator/SP.DYN.IMRT.IN

Toshkov, D. (2017, September 13). *QCA solution types and causal analysis*. RE-DESIGN. Retrieved June 7, 2022, from http://re-design.dimiter.eu/?p=905

Tubi, A., & Feitelson, E. (2016). Drought and cooperation in a conflict prone area: Bedouin herders and Jewish farmers in Israel's northern Negev, 1957–1963. *Political Geography*, *51*, 30–42. https://doi.org/10.1016/j.polgeo.2015.11.009

United Nations. (n.d.). *About Africa*. UNDP in Africa. Retrieved May 2, 2022, from https://web.archive.org/web/20200411014537/https://www.africa.undp.org/content/rba/en/home/regioninfo.html

UNOCHA. (2022, May 3). *Angola Remote Monitoring Update, April 2022*. ReliefWeb. Retrieved June 15, 2022, from https://reliefweb.int/report/angola/angola-remote-monitoring-update-april-2022

Van Weezel, S. (2019). On climate and conflict: Precipitation decline and communal conflict in Ethiopia and Kenya. *Journal of Peace Research*, *56*(4), 514–528. https://doi.org/10.1177/0022343319826409

Van Weezel, S. (2020). Local warming and violent armed conflict in Africa. *World Development*, *126*, 104708–104719. https://doi.org/10.1016/j.worlddev.2019.104708

Venugopal, R., & Yasir, S. (2017). The politics of natural disasters in protracted conflict: the 2014 flood in Kashmir. *Oxford Development Studies*, *45*(4), 424–442. https://doi.org/10.1080/13600818.2016.1276160

Vesco, P., Kovacic, M., Mistry, M., & Croicu, M. (2021). Climate variability, crop and conflict: Exploring the impacts of spatial concentration in agricultural production. *Journal of Peace Research*, *58*(1), 98–113. https://doi.org/10.1177/0022343320971020

Vicente-Serrano, S. M., Beguería, S., & López-Moreno, J. I. (2010). A Multiscalar Drought Index Sensitive to Global Warming: The Standardized Precipitation Evapotranspiration Index. *Journal of Climate*, *23*(7), 1696–1718. https://doi.org/10.1175/2009jcli2909.1

Vogt, M., Bormann, N.C., Ruegger, S., Cederman, L.E., Hunziker, P., & Girardin, L. (2015). Integrating Data on Ethnicity, Geography, and Conflict: The Ethnic Power Relations Data Set Family. *Journal of Conflict Resolution, 59*(7): 1327-1342.

Von Uexkull, N., & Buhaug, H. (2021). Security implications of climate change: A decade of scientific progress. *Journal of Peace Research*, *58*(1), 3–17. https://doi.org/10.1177/0022343320984210

Von Uexkull, N., Croicu, M., Fjelde, H., & Buhaug, H. (2016). Civil conflict sensitivity to growing-season drought. *Proceedings of the National Academy of Sciences*, *113*(44), 12391–12396. https://doi.org/10.1073/pnas.1607542113

Wagemann, C. (2017). Qualitative Comparative Analysis (QCA) and Set Theory. *Oxford Research Encyclopedia of Politics*. https://doi.org/10.1093/acrefore/9780190228637.013.247

WID. (2022, January 19). *World Inequality Database*. WID - World Inequality Database. Retrieved June 3, 2022, from https://wid.world/

Zeccola, P. (2010). Dividing disasters in Aceh, Indonesia: separatist conflict and tsunami, human rights and humanitarianism. *Disasters*, *35*(2), 308–328. https://doi.org/10.1111/j.1467-7717.2010.01213.x