MAKE IT A WASTELAND AND CALL IT PEACE: PATHWAYS TO CLIMATE-AGGRAVATED CONFLICTS IN POST-1990 AFRICA

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Abstract

This thesis revisits the climate-conflict nexus by examining whether climate change, in conjunction with other structural factors, shapes conflict dynamics during episodes of intrastate violence over scarce resources in post-1990 Africa. Drawing on the rapidly growing literature on the impact of climate change in international relations, I assess whether the adverse effects of climate change exacerbate intrastate conflicts over scarce natural resources. I follow a multi-method approach. I identify cross-country patterns in which climate change interacts with other enabling conditions to produce the outcome of violent outbreaks. I then conduct process-tracing to identify the causal mechanism in the typical (Somalia) and deviant (Ethiopia) cases. The results are consistent with previous empirical findings but also underscore how, given the increasing severity of climate change in the least developed regions of the world, efforts to prevent violence must be anchored in a consistent process of institutional capacity building and ethnic inclusion.

Keywords: climate change, armed conflict, resource scarcity, intra-state violence, QCA, Process-Tracing

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Last but not least, many thanks to my partner, who had the patience to hear all about climate change and conflict, more than it's humanly possible, and supported me.

A final thought-conflict and climate change are two very important phenomena, scary in their impacts. I could not have been more content with my topic choice, for we are yet to learn more about their point of convergence.

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1 INTRODUCTION

The 6^{th} IPCC report indicates that disenfranchised communities, who have historically contributed least to climate change, are currently disproportionately affected by its adverse consequences (Intergovernmental Panel on Climate Change, 2023). Further, "most of the observed adaptation responses are fragmented and incremental", which further calls for solutions that address the crisis, or else increase the likelihood of conflict (p.8). One telling example of the climate-conflict nexus is the Mopti region of Mali, where the actions of armed groups have already accustomed the local population to outbreaks of violence, which have been exacerbated by hostilities over grazing rights. While this is a clear instance of climate change contributing to the aggravation of violence by increasing the value of scarce resources, the many pathways through which this process can occur remain to be explored.

Social scientists regard climate change as a super-wicked problem (Levin, Cashore, Bernstein, and Auld, 2012) as its consequences affect most countries in complex and uncertain ways that will become more apparent in the coming decades as the climate crisis unfolds (Falkner, 2016). Water - too much (i.e., floods), too little (i.e., droughts), too unpredictable (i.e., extreme weather patterns), as well as increased stress on access to freshwater are examples of the channels through which climate change triggers adverse impacts. Other resources such as arable land, fossil fuels (oil and gas), and rare minerals (diamonds, gold, copper) will also become either directly scarce or less accessible. Against this backdrop, natural resources essential to the well-being of some of the world's least developed regions will become even scarcer, increasing dependence on a limited source of wealth, and fostering rivalries (Evans, 2011; Pielke Sr, 2013).

Considering these developments, international relations (IR) scholars have analysed how under conditions of resource scarcity, defined as "as a reduction in economic welfare due to a decline in the quality, availability or productivity of natural resources" (Cleveland and Ruth, 1997), the propensity for intrastate conflict is already extremely high (Gleditsch, 2012; Koubi, 2019; Scheffran, Brzoska, Kominek, Link, and Schilling, 2012a). However, we still have relatively little evidence on whether exposure to climate change itself has an aggravating effect, or whether it merely interacts with other contextual conditions in localized yet complex ways.

This thesis attempts to address this gap by asking whether exposure to climate change is an aggravating condition for intrastate episodes of violence, and if so, what mechanisms underpin this relationship. Empirically, I leverage an exhaustive dataset of intrastate violence in post-1990 Africa, which is the region most affected by both domestic turmoil and the adverse effects of climate change. I hypothesize that when a region is highly exposed to climate change, and thus resources depletion is heightened, the effects of other structural conditions, such as ethnic fragmentation, lack of relative stateness, or regime durability, interact to trigger an upsurge in intrastate episodes of violence.

To provide empirical evidence, I propose a multi-method design aiming to address the causal complexity inherent in the climate-conflict nexus. First, I employ a crisp-set Qualitative Comparative Analysis (csQCA) protocol that reveals the configuration of necessary and sufficient conditions for the presence and absence of aggravated episodes of violence in 45 cases in Africa since 1990. The results confirm my expectations and show that a high degree of exposure to climate change in combination with the aforementioned conditions is sufficient for the occurrence of an aggravated episode of violence. Second, I conduct process tracing (PT) in the “typical” case of Somalia and the deviant case of Ethiopia. PT enables me to isolate the causal mechanisms through which climate change aggravates violence when combined with other domestic conditions. The typical case is used to demonstrate the existence and relevance of the mechanisms, while the deviant case allows me to probe its theoretical limitations.

This thesis contributes to several strands of literature in the field of IR. First, to the best

of my knowledge, this is the first paper to explicitly examine whether climate change plays a distinct role as an aggravating condition for intrastate violence. By showing that exposure to climate change is a necessary context for this type of violence, I complement existing literature, which treats the adversities of climate change as a background against which other politico-economic phenomena unfold (Bretthauer, 2015; Ide, Brzoska, Donges, and Schleussner, 2020).

Second, I provide one of the first accounts of how different climate-induced adversities (droughts, floods, increased resource scarcity) act as triggers of violence, highlighting the importance of domestic conditions in what are often conceptualised as regional armed conflicts that spill over into a particular country for exogenous reasons. The endogeneity of aggravated episodes of violence provides insights into how such episodes can be properly addressed. Third, this thesis adds to the growing body of work in IR (Ide et al., 2020) that relies on set-theoretic methods to uncover causal complexity and answer causal questions. While the csQCA protocol I use does not by itself recover causal pathways from conditions to outcome, it serves as a data classification algorithm to identify cross-country patterns of conditions present for the occurrence of the outcome (outbreak of violence). I complement the results with process tracing (PT), which sheds light on the causal mechanism at play.

The rest of the paper is structured as follows. In Chapter 2, I review the existing literature. Then, in Chapter 3, I construct my main argument. Chapter 4 builds the conceptual and theoretical framework. Chapter 5, I provide an in-depth discussion of my methodological setup, which includes the case selection procedure and the ope rationalisation of the conditions. Then, in Chapter 6, I analyse the empirical findings and conduct PT in the typical case of Somalia and the deviant case of Ethiopia. Chapter 7 concludes.

2 PREVIOUS LITERATURE

2.1 Conceptualising climate change as a security matter

The field of IR underwent several ontological transformations since the end of the Cold War, evolving to meet the challenges of the times. Barry Buzan, a leading scholar in the field, noted in his seminal 1997 book that modern security studies have broadened the definition of security to include a wider range of threats. According to Buzan (1997, 12), these new threats, including environmental concerns, departed from the previously dominant military-centred paradigm. The focus on the environment as a source of (in)security has its roots in the mainstream debates that emerged in the late 1990s on the potential consequences of climate change (Graham, 2000).

Thomas Homer-Dixon initiated the first debate in the field, by exploring the links between environment and conflict and coining the term 'environmental scarcity' (Homer-Dixon, 1991). The focal point of this debate was how to conceptualise the environment as a security matter by unpacking the elements of international and regional climate regimes that could affect the behaviour of international actors. The second debate began in the mid-2000s, with research agendas linking climate impacts (e.g., droughts, hurricanes) to security threats and human welfare (Busby, 2018). Salehyan and Hendrix (2014) caution scholars that a sole focus on resource scarcity due to climate change may lead to inaccurate predictions and that the negative consequences of climate change and armed conflict are instead dependent on socio-political conditions (p. 315). I argue that the field is also in the grip

of a third debate initiated by Ide (2017). While the previous debates focused on substantive issues, this one is methodological, fostering discussions on which toolkit best captures the complex mechanisms linking climate change and security. Given the primacy of causal complexity in assessing climate- or resource-driven conflicts, much of the literature produced in recent years has used set-theoretic methods such as QCA (Beaumont and Coning, 2022; Bretthauer, 2015; Ide, 2015a, 2015b; Ide et al., 2020; Ide, Kristensen, and Bartusevičius, 2021).

There are four key takeaways from the climate change and conflict stream, in which the current research is situated, based on the seminal papers by Gleditsch (2012) and Von Uexkull and Buhaug (2021). In unpacking the impact of climate change on intrastate armed conflict, climate change is found to have a relatively small effect compared to other conflict drivers, but remains a consistent conflict stressor in contexts of low socio-economic development, low statehood, and intra-group inequalities. Finally, there is a dominant quantitative approach that seeks to identify the causal mechanism and link between climate change and conflict (p. 3) but fails to capture complex multi-level interactions between predictors of violence.

2.2 Climate change and resource scarcity

Much of the IR literature on the consequences of climate change has focused on how the climate crisis increases resource scarcity in the world's least prosperous regions and, combined with other contextually embedded, pre-existing factors, increases the likelihood of intrastate violence. However, the literature remains sparse and does not provide a comprehensive typology of climate-aggravated conflicts.

A landmark paper was written by Maxwell and Reuveny (2000), who developed a rational choice model that builds on earlier research by Prskawetz, Feichtinger, and Wirl (1994) and Brander and Taylor (1998) on resource scarcity and conflict in developing countries. Using the grammar of game theory and the logic of formal modelling, the authors show that resource scarcity may not only trigger violent intrastate conflicts in developing countries

but can also hinder peace processes by reducing aggregate welfare due to economic losses. Building on this theme, a significant body of empirical literature links resource scarcity to conflict (Homer-Dixon, 1991; Urdal, 2008). A pioneer of this approach, Homer-Dixon (1994) distinguishes three forms of conflict driven by resource scarcity exacerbated by climate change: interstate conflict, group identity conflict, and civil unrest.

2.3 Climate change and intrastate violence

Recent research trends have tended to focus more on the precise ways in which climate change can potentially trigger intrastate conflicts. On the one hand, conflicts over freshwater have received considerable attention in this area. Gleick and Heberger (2014) propose a typology of water scarcity-driven conflicts, distinguishing four types of conflicts and associated actors at the forefront of water-driven conflicts: water as a military tool, water as a military target, terrorism over water resources, and development disputes. Barnett and Adger (2007) argue that water scarcity is not the main cause of conflict, but rather the lack of institutional adaptability to water scarcity. On the other hand, work on the relationship between droughts and conflict has shown that droughts do not necessarily increase the risk of civil war but can influence its dynamics. For example, Theisen, Holtermann, and Buhaug (2011) developed a spatial dataset for Africa and found that while droughts do not increase the risk of civil war onset, they can affect its dynamics. Similar findings were reported by Von Uexkull and Buhaug (2021), who found that droughts have a stable effect on protracted violence.

Despite the growing body of work, the precise effects of certain conditions on the intensification or duration of resource-related conflicts are not well understood. For example, Collier, Hoeffler, and Söderbom (2004) hypothesised that rebellions motivated by the potential to gain economic benefits from resource exploitation or conducted without a clear strategy are more likely to result in prolonged conflicts. Finally, in the forum opened by Ide et al. (2023), von Uexkull notes that for more than a decade the focus of the strand has been on the likelihood and severity of physical violence, with a particular focus on non-state ac-

tors (pp. 8-9).

2.4 Climate change and intrastate violence in Africa

Africa is the most studied context for climate-conflict research, with a particular focus on rural areas (Adams, Ide, Barnett, and Detges, 2018; Hendrix and Salehyan, 2017). Recently, von Uexkull pointed out that from an empirical perspective, sub-Saharan Africa has attracted the most scholarly attention, in part due to the availability of data (Ide et al., 2023). In an earlier piece, Adams et al. (2018) note that research on violent conflict and climate change suffers from a 'streetlight effect'[1], with a biased sample on Africa. I argue that Africa is a relevant region for understanding the climate-conflict nexus. It exhibits the most severe impacts of climate change (Busby, 2018), and, due to its historical development, the region displays high variation in most of the conditions of interest: from political and ethnic fragmentation to different types of conflict, potentially revealing the interactive ways in which climate change affects the propensity to outbreak violence (Hendrix and Glaser, 2007; Hendrix and Salehyan, 2012, 2017; Mach et al., 2019; Scheffran et al., 2012a; Scheffran, Brzoska, Kominek, Link, and Schilling, 2012b).

Regarding intrastate violence and climate change, Hendrix and Glaser (2007) find that fertile climates in sub-Saharan Africa are less conducive to conflict, while "negative changes in precipitation" increase the likelihood of conflict in the following year (p.1). Hendrix and Salehyan (2012) find a correlation between rainfall and the onset of civil wars and insurgencies, with "wetter years" showing higher levels of violence (p.35). However, despite the emerging scholarship, we have yet to understand the distinct and numerous pathways by which climate change and conflict interact.

[1] The *streetlight effect* refers to the tendency to concentrate on a region for reasons of convenience rather than relevance.

3 Main Argument

I hypothesise that exposure to the adverse effects of climate change increases the likelihood of outbreaks of intrastate violence over scarce resources. Exposure to climate change acts as an exogenous shock to societies, which, in conjunction with structural factors affecting the propensity to violence in that context, increases conflict. Climate change needs to be understood not as a single causal factor, but as an enabling condition that, together with other domestic and international conditions, creates a necessary and sufficient configuration for aggravation of violence.

My theory applies to contexts where conflicts over scarce resources exist and to contexts where such conflicts have not yet occurred, yet intra-state violence exists. I now provide a mechanistic framework for understanding the channels through which the effects of exposure to climate change propagate, then clearly delineate which parts of the framework apply to which type of context. There are two processes underlying this framework, that act sequentially.

First, exposure to climate change leads to the resourcification of conflicts. Regardless of whether a society experiences violent conflicts over resources, scarcity is an inescapable reality. Latent conflicts over resources are a natural occurrence, but most communities manage the scarcity well enough to avoid actual violence. However, climate change increases the importance of resources, by making them more valuable as demand for them is growing despite a fixed supply, or by making resource scarcity more salient for some segments of the population.

Second, because of natural resources depletion, climate change heightens resource scarcity. Climate change shifts the availability of resources downwards, making it less likely that people in a community are able to meet their needs. This increases the likelihood of conflict, especially when combined with the inability of national and international institutions to create adequate redistribution schemes for scarce resources.

How does this causal chain produce conflict? Where conflicts over resources exist, resourcification has already occurred at some point in the past because of the naturally heterogeneous distribution of resources across the world. Therefore, the impact of climate change works primarily through the second mechanism, accelerating the depletion of already scarce resources. Since the parties to the conflict were already fighting over access to this resource, which is now marginally more valuable as it becomes scarcer, the cost of continuing the conflict is reduced. As the likelihood of prolonging a conflict increases, the likelihood of it worsening also increases, since longer conflicts are more likely to intensify.

The situation is more complex in countries where intra-state violence exists but is not primarily driven by resource scarcity. In such cases, the conflicts over resources are latent, but given the history of violence, their probability of occurrence is not null. Exposure to climate change raises the probability of intensified conflict, as it enables actors to motivate their grievances in relation to the increasing scarcity. For example, ethnic violence driven by competing claims over territory can also be motivated by the need for freshwater hot spots in that piece of land. If a conflict has become resourcified, then the second mechanism kicks in. As resources continue to deplete, parties engaged in a conflict become more likely to value the scarce resource, increasing the likelihood of violent outbreaks to secure their access.

Figure 3.1 depicts the logic of resourcification. Aggravated resource conflicts are a subset of resource conflicts, which are a subset of intrastate violence. In this case, exposure to climate change does not directly affect the likelihood of aggravated resource conflicts (i.e., it does not increase the size of the small circle). Instead, it increases the share of resource conflicts in the total number of violent episodes by transforming latent resource conflicts into actual conflicts. Visually, this means a larger medium circle and, assuming the probability of

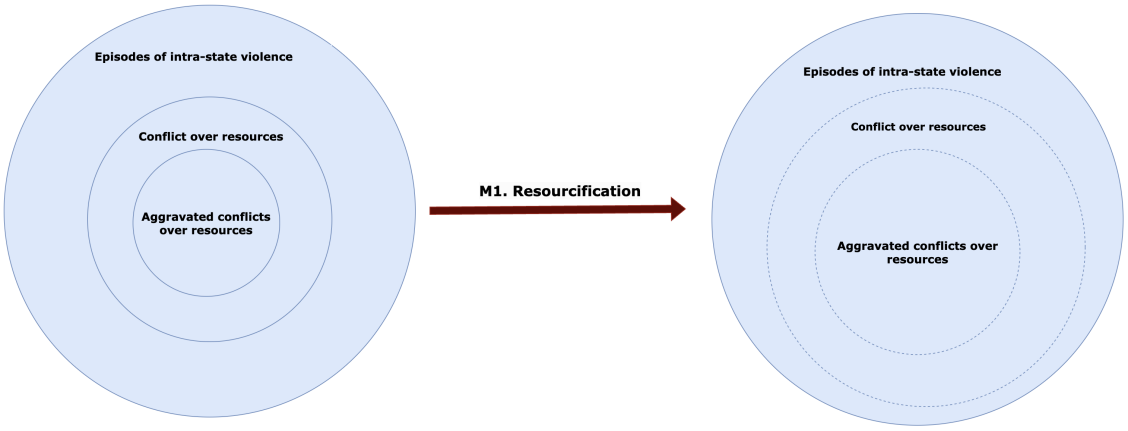

Figure 3.1: Resourcification

aggravation is held constant, an increase in the share of aggravated conflicts (small circle). Suppose there are a total of 10 episodes of intrastate violence, 6 of which are fought over scarce resources and 3 of which worsen over time. An instance of resourcification would take 2 of the remaining 4 episodes of intrastate violence that were not related to resources and make resources central. Under the assumption of constant effects, we would expect 4 of the (post-resourcification) conflicts to aggravate, more than the initial number of 3.

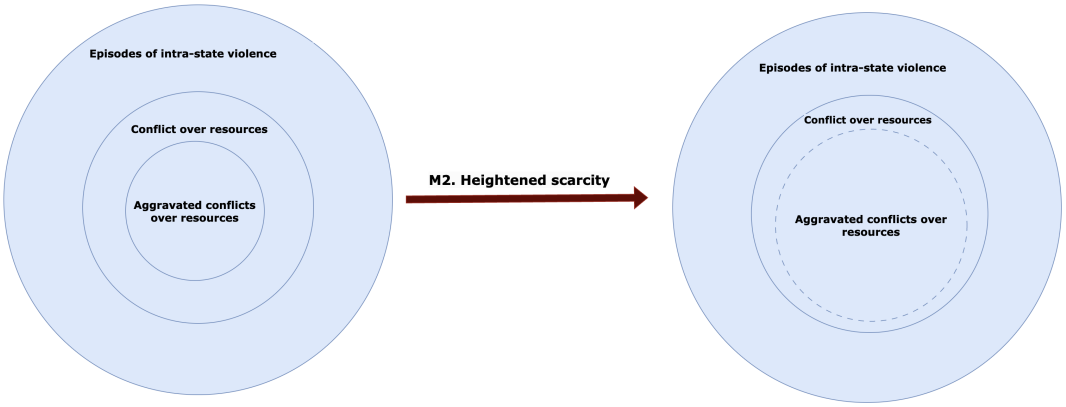

Figure 3.2: Heightened resource scarcity

Figure 3.2 displays the logic of increasing scarcity. It is assumed that resourcification has already taken place, either recently, due to climate change, or for other historical reasons. Here, the size of the medium cycle remains fixed. What changes is the expected proportion of aggravated conflicts as a proportion of total resource conflicts, i.e., the relative size of the small circle within the medium circle. Going back to the initial numerical example, we

would still have the initial number of 6 out of 10 resource conflicts, but instead of 3, we would have 4 conflicts that we expect to aggravate[2].

Drawing on previous empirical work on the climate-conflict nexus, I do not expect the model to apply uniformly across cases. In some instances, resourcification is the main driver of violent outbreaks, while in other it would be the spike in resource scarcity. As mentioned before, climate change is one conflict stressor, but operates in conjunction with structural conditions unique to each context. I expect my model to apply to cases where there is relatively high resource scarcity and where exposure to climate change has been intense in recent decades. My empirical analysis focuses only on cases that have occurred since 1990, as climate change has had visible and measurable effects only in the past three decades[3].

[2]Both mechanisms might apply to the same context, in which a conflict becomes resourcified, and then the heightened scarcity leads to outbreaks of violence.

[3]Data availability also suggests post-1990 to be a reliable time period for studying the climate-conflict nexus.

4 Conceptual Framework

To test my model, I adopt a multi-method approach that combines csQCA with PT. The foundation of this empirical strategy is a series of conditions and outcomes, which I conceptualise and operationalize below, leveraging a variety of data sources. Ultimately, all the conditions are operationalised using binary indicators, in line with the requirements of the calibration phase in the csQCA protocol.

4.1 High exposure to climate change (ECC)

To measure the level of exposure to climate change, I use the Physical Vulnerability to Climate Change Index (PVCCI) (Feindouno, Guillaumont, and Simonet, 2020). The PVCCI is a composite indicator that measures exposure to shocks, conditional on their magnitude.

I have converted the scores to binary indicators, while the impact of exposure to climate change in the region is treated comparatively. In the absence of data going back to early 1990, I calibrated countries comparatively by first creating an average for the subset of African countries studied and then converting the score to '1' - for countries above the average showing climate impact effects and '0' - for those below the expected regional average. This approach to calibration, while not traditional for QCA, enables me to recover patterns of necessity and sufficiency relatively within my precise population of cases.

4.2 High ethnic fractionalisation (EF)

I use the definition of ethnic fractionalisation proposed by Dražanová (2020): "the probability that two randomly selected people from a given country belong to different [ethnic]] groups". The condition thus ranges from 0 (perfectly homogeneous) to 1 (highly fragmented)". Binary indicators have been created during the calibration in the same way: 1- for highly fragmented cases, 0- ethnically homogeneous countries. This condition will likely matter because less homogeneous societies are less likely to have designed resource governance institutions, which mechanically increases the odds of conflict commencement.

4.3 Low relative stateness (RS)

I use Møller and Skaaning (2010)'s conceptualisation of stateness as having the attribute of a monopoly on the use of force within a sovereign territory (p.1). I define low stateness as the absence of this attribute, which in practice can be equated with the fragility of the institutional framework. I use the Quality of Governance (QoG) database to measure relatively low state fragility. Cases with relative state fragility score a '1', while states lacking the attribute score a '0'. Lack of stateness is expected to matter because, given the absence of one of these two definitory attributes, good resource governance is less likely, and therefore violent conflicts are to be expected more, on average.

4.4 High regime durability (RD)

I draw on QoG's definition of regime durability, where regime durability is understood as 'the number of years since the last regime change (defined by a three-point change in the polity score over three years or less) or the end of a transition period defined by the absence of stable political institutions (denoted by a standardised authority score)' (p.1164). While regime durability and low stateness could be highly collinearity, QCA, as an algorithm, is not sensitive to this issue (Saini and Hrušecká, 2021).

4.5 High political opportunity structure (HPO)

I use the conceptualisation of political opportunity structures proposed by Skrede-Gleditsch and Ruggeri (2010). They argue for conceptualising political opportunity structures as phases and looking at regular and irregular leaders' entries and exits to and from power (p. 302). The mechanism by which they link the "security with which leaders hold office to the risk of civil war" lies behind the challengers' strategic use of violence when they perceive a window of opportunity (p. 302).

I use data from Archigos: A Database of Political Leaders to assess whether irregular transitions occurred in a 24-month window before or after intrastate conflict. Such a window is necessary for opportunity structures to be exploited, both the challenger and the state needing time to prepare. In terms of measurement, '1' represents a case where an irregular entry or exit to power occurred in a 24-month window before or after the intrastate episode of violence, and '0' represents the absence thereof.

4.6 Territorially motivated conflicts (HTM)

Scholarship has expanded our understanding of how territory leads to the outbreak of intrastate violence, not only as an independent factor but also in combination with other factors (Toft, 2014). Despite many alternative escalation measures, Braithwaite and Lemke (2011) demonstrate the "consistent influence of territory on escalatory processes regardless of how escalation is measured". Therefore, a final condition I consider is whether the conflict had a strong territorial component.

To assess this, I rely on data from the UCDP Non-State Conflict Dataset, which includes information on whether any conflict was driven by incompatibility over territory. Thus, a '1' represents a case where territory played a crucial role in the intrastate episode of violence, and a '0' represents cases where territory was not a central feature of the conflict.

4.7 Aggravation in conflicts over resources (OUTCOME)

I use data from the PRIO Natural Resource Conflict Dataset to measure my dependent variable (outcome)[4]. The dataset codes whether internal armed conflicts are linked to natural resources. It distinguishes between three mechanisms that link conflict to natural resources as a source of: 1) disagreement, 2) revenue, 3) exacerbation of ongoing conflict, the latter being my focus. This is the main outcome I analysed during the csQCA phase and, later, through PT.

To measure resource scarcity, I draw on the definition proposed by Cleveland and Ruth (1997), where an "increase in natural resource scarcity is defined as a reduction in economic welfare due to a decline in the quality, availability or productivity of natural resources" (p.1).

[4]QCA traditionally focuses on conditions rather than variables. I mention the outcome as the dependent variable to ensure a smooth interdisciplinary reading of my thesis. For more details about the language appropriate in QCA, see Schneider and Wagemann (2012)

5 RESEARCH DESIGN

5.1 Case selection

To compile my dataset[5], I started from the Natural Resource Conflict Dataset updated by the Peace Research Institute Oslo (PRIO) (Rustad and Binningsbø, 2012). The dataset codes whether intra-state armed conflicts can be linked to natural resources in one of the three aforementioned ways.

The main advantage of using the Natural Resource Conflict Dataset is that it provides a plethora of cases of both the occurrence and the non-occurrence of resource-driven conflicts, which enables me to assess the configurations of conditions necessary and sufficient for the presence and absence of the outcome (Schneider and Wagemann, 2012, 12). Theoretically, my case selection strategy relies on selecting diverse cases to maximise variation in the characteristics of country-year dyads, potentially capturing a larger number of pathways connecting the conditions to the outcome across cases (Seawright and Gerring, 2008). In the calibrated dataset, whether a conflict is over scarce resources or not is captured by the condition "RC" (resource conflict), and it is coded based on the "PRIO-Natural Resource Conflict Dataset". A “0” has been attributed to cases where natural resources were not part of a central mechanism of intrastate violence and a “1” where they were.

I restrict my analysis to cases that took place after 1990, in Africa, which allows me to disentangle the effect of the conditions I am interested in from the international dynamics

[5] A table with the list of cases and their membership scores in all the conditions can be found in Appendix A

from the late stages of the Cold War[6]. This scope condition is especially important given that the consequences of climate change started to manifest more stringently in the 1980s (Gupta, 2010). A limitation of my research is the availability of fine-grained climate-related data before the 1990s.

5.2 Set-Theoretic Multi-Methods Research (SMMR)

I use a multi-method design that combines QCA with PT. The choice of methods aims to validate my causal inferences. This is done by looking sequentially at the cross-case and within-case levels. The rationale for using SMMR is driven by the high compatibility between QCA and PT, and the need to bridge condition- and mechanism-centred variants of SMMR.

While QCA reveals set-relational patterns across cases, it does not allow for causal inference. Nevertheless, I rely on QCA to show that a high degree of exposure to climate change, in conjunction with other conditions, is sufficient to produce an aggravation of violence in conflicts over resources. PT allows for identifying a within-case mechanism that establishes a cause (or "conjunction of causes") and its association with an outcome.

Schneider and Rohlfing (2013) provide the most complex and robust account of how to combine QCA and PT (p. 563), which I use to select the typical and deviant cases in the post-analytic moment of the csQCA protocol.

5.3 Qualitative Comparative Analysis

Qualitative Comparative Analysis (QCA) is a set-theoretic method developed by Ragin (1987) to bridge the gap between case-oriented and variable-oriented research, the two main traditions underlying comparative social sciences (Rihoux and Ragin, 2008). The primary aim of this approach is to systematise and formalise the comparative method, thereby helping researchers to answer 'cause of effect' questions, which seek to determine why a particular

[6]Of course, the consequence of the Cold War ending was still shaping political dynamics across African countries, but in a less direct manner. Additionally, my selection of conditions is well-suited for capturing indirect effects, which manifest primarily through domestic channels

outcome has occurred across the population of cases (Mahoney and Goertz, 2006, 230-231).

The fundamental assumption underlying QCA is that claims about conceptual interactions in the social sciences can be expressed as relations between sets rooted in Boolean algebra and the logic of propositions (Wagemann, 2014). If this assumption is correct, then questions about what conditions lead to the occurrence of a particular outcome are reduced to the analysis of subset-superset relationships, which can then be interpreted as either necessity or sufficiency patterns (Schneider and Wagemann, 2012, 1-8).

The main advantage of QCA, compared to multivariate regression models(Achen, 2005; Clarke, 2005, 2009), is its ability to deal with causal complexity. Causal complexity is an umbrella term capturing equifinality, conjunctural causation and causal asymmetry. Equifinality refers to the possibility that multiple configurations of conditions can lead to the same outcome, which differs from the traditional all-encompassing causal path assumed by most econometric models. Conjunctural causation captures the idea that conditions may not by themselves facilitate the occurrence of an outcome but only have their causal power in combination with other enabling conditions. Finally, causal asymmetry assumes that different configurations of conditions can distinctly explain occurrence versus non-occurrence of the outcome.

These principles of causal complexity apply to the study of climate-aggravated conflicts, making QCA an appropriate methodological tool for addressing this issue. First, the heterogeneity found in the existing literature on the conditions for the intensification, prolongation or even onset of conflict suggests an equifinal phenomenon (Scheffran et al., 2012a, 2012b). Second, several studies point to the importance of various interacting factors in shaping the development of episodes of intrastate violence reinforced by resource scarcity, such as the complex interplay between ethnic tensions, lack of education, and agricultural dependence (Bretthauer, 2015).

My methodological choice aligns with recent set-theoretical developments in the field of IR, where QCA and, more broadly, configurational methods have gained ground over the past decade. However, QCA is not without its limitations, as the method cannot properly recover causal estimates in the absence of complementary methods such as PT cannot pro-

duce reliable results outside of certain condition-to-case ratios, and often justifies too many degrees of freedom for the researcher (Ide and Mello, 2022; Marx and Dusa, 2011).

However, beyond the methodological shortcomings that can be addressed, QCA can be conceptualised as a classification algorithm through which I distinguish patterns of similar relationships between exposure to climate change and exacerbation of resource conflicts. Each case is classified as a specific combination of empirically existent conditions out of logically possible and theoretically justified possibilities. This classification, which is similar to a causal typology, allows me to conduct a more targeted PT, thereby increasing the overall validity of my claims.

5.4 Process-Tracing

The theoretical model I propose provides a mechanistic understanding of how the complex effects of climate change propagate. To demonstrate the relevance of my theorised mechanisms, I use PT, a qualitative method that aims to isolate mechanisms by looking at the evidence that would necessarily be present if the mechanism were in place (Waldner, 2012).

In practice, Levy (2008) says that it "involves an intensive analysis of the evolution of a sequence of events over time, and is particularly well suited to the task of uncovering intervening causal mechanisms and exploring reciprocal causation and endogeneity effects" (p.6). In this thesis, I subscribe to Beach and Rohlfing (2018)'s understanding of causal mechanism , which "describes how a cause (or a combination of causes) produces or contributes to an outcome".

To demonstrate the existence of my two mechanisms and to obtain a fine-grained account of the processes that take place during intrastate conflicts, I leverage a periodization strategy that divides the conflict into three periods: pre-conflict, aggravation, and post-escalation. Accordingly, I use data from the 24-month periods leading up to the aggravation and until the episode of violence ceases or exceeds the intrastate level.

The period before and after 24 months allows me to properly assess shifts and changes in the interactions between my conditions. While exposure to the adverse effects of climate

change is a long-term process, with effects often similar to or occurring at a much slower pace, I argue that changes in the other conditions (such as high political opportunity) are more dynamic, making them likely to occur in the selected window of opportunity. In this way, exposure to the adverse effects of climate change can be understood as a background condition that, although it cannot account for the timing of conflict, interacts with dynamic factors to intensify violence.

As part of the PT protocol, I aim to identify and analyse critical junctures to establish a credible sequence of factors and events that led to the outcome of interest. Critical junctures are defined as "relatively short periods of time during which there is a substantially increased probability that agents' choices will affect the outcome of interest" (Capoccia and Kelemen, 2007, 348). While I do not refer to a specific agent, given the scope of my analysis, I argue that there is a substantially increased probability that a given conflict will exhibit an outbreak of violence after the parties to the conflict have been exposed to the adverse effects of climate change.

6 RESULTS AND DISCUSSION

6.1 QCA Protocol

In the first step of the csQCA protocol, I examine whether there is an individually necessary condition for the aggravation of resource conflicts, as shown in Table 1. My first conclusion is that, as the existing literature suggests, a high degree of exposure to the adverse consequences of climate change is not in itself necessary for aggravation. Instead, the two conditions that could be considered necessary are the existence of a conflict over resources in the first place (which leads to my first causal mechanism of resourcification) and, more interestingly, ethnic fractionalisation (EF). EF has a consistency of 0.833, a coverage of 0.3333 and a relevance of necessity of 0.4286. Crucially, the last fit parameter tells us that EF is necessary for both aggravation and non-aggravation, which makes the condition fail relevancy of necessity test.

I then proceed to the analysis of sufficiency, which begins with the construction of the truth table from my original dataset, shown in Appendix C. Out of 128 logically possible combinations of conditions, only 33 of the cases are not logical remainders, indicating empirical concentration around a set of limited structural conditions shaping conflicts. Of these 33, 6 still pass the thresholds set for the parameters of fit. The remaining 27 do not satisfy the parameters of fit (I set the threshold of consistency at 0.84), making them unreliable, and I therefore exclude them from the analysis per best practices (Schneider and Wagemann, 2012). From the logical minimisation process applied to the truth table, I re-

	Consistency	Coverage	Relevance of Necessity
Ethnic fractionalization (EF)	0.833	0.333	0.428
Relative stateness (RS)	0.500	0.240	0.518
Exposure to climate change (ECC)	0.333	0.307	0.780
Regime durability (RD)	0.667	0.421	0.702
Resource conflict (RC)	0.916	0.423	0.558
High political opportunity (HPO)	0.416	0.357	0.775
High territorial motivation (HTM)	0.583	0.333	0.631
~Ethnic fractionalization (~EF)	0.166	0.133	0.697
~Relative stateness (~RS)	0.500	0.300	0.641
~Exposure to climate change (~ECC)	0.667	0.250	0.350
~Regime durability (~RD)	0.333	0.154	0.463
~Resource conflict (~RC)	0.083	0.052	0.590
~High political opportunity (~HPO)	0.583	0.225	0.364
~High territorial motivation (~HTM)	0.416	0.208	0.525

Table 1.Analysis of necessity for the presence of the outcome

trieve the most parsimonious solution. There are three distinct paths (see Table 2). Each pathway in the most parsimonious solution consists of a conjunction of logical conditions that, taken together, are sufficient for the outcome to occur.

The first pathway, ECC*~ RS*RC, shows that significant exposure to the adverse effects of climate change (ECC), combined with a lack of relative stateness (RS) and conflict over scarce resources (RC), is sufficient for the outcome, that is an outbreak of violence in the conflict. Recall that low relative stateness (RS) is conceptualised as the absence of either a monopoly on the use of force within a sovereign territory, or a basic agreement on citizenship, or both. Therefore, lack of relative stateness (RS), in either of its forms, is individually insufficient for violent outbreaks, but interacted with the particularities of resource conflicts (RC) as heightened by climate change (ECC), it becomes a central pillar for the aggravation of violence. The third condition that is part of this solution term, the presence of a pre-existing conflict over scarce resources (RC), implies that the episode of intrastate violence occurred against the backdrop of either a diminishing or already scarce resource. Thus, my two causal mechanisms can be distinguished within this causal pathway.

MOST PARSIMONIOUS SOLUTION: $ECC * \sim RS * RC + ECC * RC * HPO + \sim ECC * RS * RC * HTM \rightarrow OUT$

PATHWAY	CONSISTENCY	PRI	COVERAGE R.	COVERAGE U.
***ECC* * ~RS * RC**	1	1	0.250	0.250
ECC * RC * HPO	1	1	0.250	0.250
+~ECC * RS * RC * HTM	1	1	0.083	0.083

Table 2.Analysis of sufficiency for the presence of the outcome—most parsimonious solution

Accordingly, the second mechanism at play is the heightening of scarcity in the case of resources (M2). Here, exposure to climate change (ECC), combined with a high political opportunity structure (HPO), would affect the propensity for aggravated episodes of violence. In practice, this would mean that in the context of a conflict over scarce resources (RC), the government's efforts to contain the outbreak of violence would not be successful. This is partly due to the lack of legitimacy of the government ordering the cessation of violence, which often stems directly from the twin attributes of exclusionary citizenship laws (understood in this study as broader exclusionary policies).

The mechanism is intuitive: when a group excluded from the socio-political and economic landscape of a country engages in conflict over scarce resources (e.g., access to fresh water), the conflict is exacerbated by the lack of legitimacy of the ruling government based on previous patterns of exclusion. This could be explained in terms of the problem of credible commitments, aggravated by scarce resources: if (ethnic) intrastate groups perceive the government as lacking redistributive capacity, where resources are central not only to the welfare but also to the livelihoods of excluded groups, the struggle over (in this hypothetical case) freshwater would intensify.

The first mechanism, the resourcification of conflict (M1), could also be at play. Here, the looming threat of future resource scarcity due to significant exposure to the adverse effects of climate change, in the context of a state that lacks the legitimacy to enforce a monopoly on the use of force, or that has excluded certain groups in the past, would make the use of force an optimal strategy for excluded groups to intensify their struggle at a point in time

T_0 (when scarcity has not yet reached its peak) to secure access in the future, at T_1.

The second path, ECC*RC*HPO, implies that the outcome is likely to follow against a background of significant exposure to climate change (ECC) and conflict over resources (RC), and a high political opportunity structure (HPO). The first two terms of the conjunction (ECC*RC) are identical to the first pathway. What changes is the presence of high political opportunity (HPO). Recalling Skrede-Gleditsch and Ruggeri (2010)'s conceptualisation of high political opportunity Addis Ababa structures, this means that an irregular entry or exit of a leader from power would indicate a state of vulnerability, which in turn would be exploited by the challenging groups.

Mechanisms M1 and M2 might also operate in tandem, in a mutually reinforcing pattern. Even if resources are already scarce (due to the nature of conflicts fought over scarce resources), a high opportunity structure could trigger an increase in violence in several ways. First, the perceived weakness of the government, triggered by an irregular exit (assassination) or entry into power (e.g., after a coup d'état), would encourage the challenger group to act more aggressively and take advantage of the regime's temporary inability to meet challenges. While the trigger is almost identical, the motivation of the groups can be immediate scarcity (in the case of M2) and the looming threat of future scarcity (M1).

Overall, looking at both pathways, which already include exposure to climate change in conjunction with exposure to climate change, resourcification (M1) has most likely occurred in the past, and the exacerbation of violence is diffused through increased scarcity induced by climate change.

There is a third pathway leading to the outcome of violent outbreaks ~ ECC*RS*RC*HTM. The lack of exposure to climate change and relative stateness, in the context of a conflict over resources that is highly territorially motivated, may lead to an exacerbation of violence. This is more likely to be a case where resourcification (M1) is more important, especially given the nature of most territorial conflicts. My contention, already discussed in Chapter 3, is that while exposure to climate change doesn't play a direct role in exacerbating violence, it does allow conflict parties to make linkages between the two types of claims: over resources and over territory. As the latter becomes more valuable because of the former, the link between

them becomes stronger, making the conflict more likely to prolong[7].

Finally, I turn to the lack of occurrence of violent outbreaks. Here, the solution is simple because it contains only one path: ECC*RS. This tells us that the combination of lack of exposure to climate change and relative stateness is sufficient for the non-occurrence of the outcome. While the lack of aggravation of violence is beyond the scope of this paper, one conclusion is very important: exposure to climate change intensifies violence in resource conflicts. It follows that in the absence of exposure to climate change, we should expect no outbreaks of violence. According to the principle of causal asymmetry, we cannot assume this. Nevertheless, I argue that in the absence of exposure to climate change, the level of violence in a conflict will either decrease or plateau.

After conducting the necessity and sufficiency analyses, I used the SMMR function in R, which is a software implementation of the general principles of SMMR research (Oana, Schneider, and Thomann, 2021), to generate a typical and a deviant case for the condition of interest: exposure to climate change. This automatic selection process ensures that my PT follows the most-similar and most-different systems approach to comparative case studies (Anckar, 2008).

The cases of Chad (1997 and 2005) and Somalia (2001) were generated as "typical cases" (cases that exhibit the conditions leading to the outcome). I will focus on the case of Somalia because it allows us to better disentangle the mechanisms at play, due to better data availability. In terms of divergent cases, the SMMR's post-analytical framework suggests five potentially divergent cases: Congo-Brazzaville (2002); Congo-Brazzaville (1997); Ethiopia (1996); Niger (1997) and Mali (1994). I will conduct PT in the case of Ethiopia (1996) because, despite the presence of the outcome, there was no significant exposure to climate change and no high political opportunity structure.

[7] One example of this pathway is South Sudan in 2013.

6.2 Process tracing

6.2.1 Somalia: A textbook case of climate-aggravated violence (2001-2006)

I will look at the violence that unfolded in Somalia in the period of 2001-2006. In 2006, Ethiopian National Defense Forces (ENDF), supported militarily by the United States, military intervened in Somalia (Civins, 2010). The intervention exited the realm of intrastate violence and became interstate violence lasting from 2006-2009, which is beyond the scope of this thesis. I will retrieve the posited causal mechanisms and illustrate how they come into play, in the 2001-2006 period, when the violence did not exceed the intrastate realm.

The first step in understanding what shaped the violence in Somalia (2001-2006) is to unpack the context in which the violence erupted. A turning point in Somali politics was the election of President Mohamed Siad Barre, whose authoritarian regime set the stage for the Somali Civil War (1991-) (Osman, undated). Most scholars trace the root of intrastate violence in Somalia to the assassination of President Barre (1969), which created the conditions for a surge in intercommunal violence in the early 1990s (Eklöw and Krampe, 2019). Throughout the 1990s, after the outbreak of civil war, one of the worst humanitarian crises forced the UN to deploy two UN operations in Somalia (UNOSOM I & II), soon followed by a US military deployment (Eklöw and Krampe, 2019). A broader theme underlying the violence in Somalia is the centrality of "territorial claims, clan and governmental disputes, especially after the outbreak of civil war in 1991" (Eklöw and Krampe, 2019). The absence of stateness, combined with unresolved grievances and armed militias, fostered a period of relatively low but persistent violence in the late 1990s and early 2000s.

A look at Sundberg, Eck, and Kreutz (2012)'s in-depth analysis of the Somali case establishes that there was a record low-intensity intrastate conflict in 2001-2002 (p.357). Eklow and Krampe (2019) note that international mediation efforts led to the establishment of the Transitional National Government (TNG) (2000-2004) and the Transitional Federal Government (TFG) (2004-2012), which were strongly opposed by the main opposing formation, the Islamic Courts, in 2006.

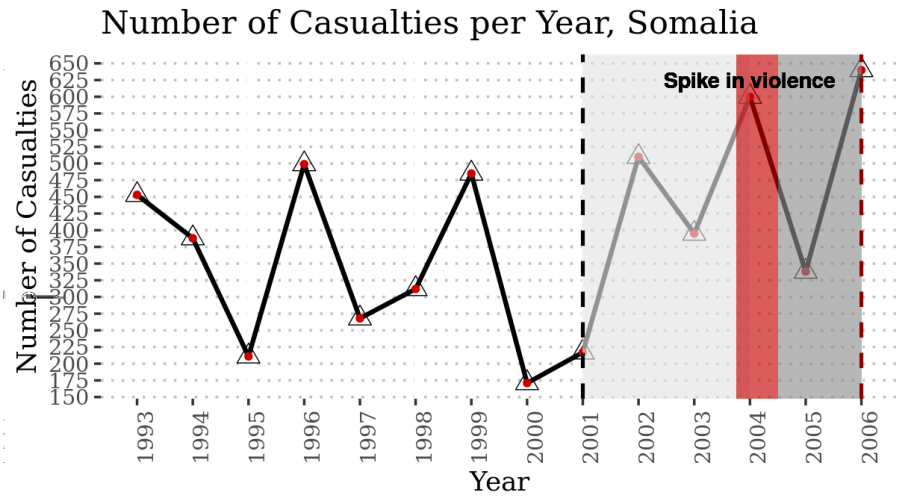

Figure 6.1: Number of casualties in Somalia, based on the UCDP Battle-related Deaths Dataset, 2022)

Sundberg et al. (2012) look at the temporal distribution of non-state conflicts and plot the number of fatalities, and finding that, surprisingly, the period when there was no stable government did not show a greater spike in violence compared to the years with a government. They argue that the Somali government was never properly equipped to suppress violence (p. 358).

The periodization of the conflict according to the proposed mechanism is as follows: pre-aggravation period (2001-2003), aggravation period (2004), post-aggravation period (2005-2006). Figure 6.1. shows that the year 2006 would represent the peak in violence, but per argued earlier, that is part of an inter-state conflict. If we look at localised violence, the year 2004 represents the peak in intrastate violence in Somalia.

Pre-Aggravation period (2001-2003) The pre-aggravation period is centred around international preoccupations regarding Somalia derived from two factors: first, the post 9/11 framework viewed Somalia's Al-Ittihad as having close ties with Al-Qaeda, as well as a broader international mediation effort, overseen by Kenya (Menkhaus, 2011). In terms of adjacent developments, the early period of 2001 oversaw the establishment of a TNG, which was violently opposed by challengers (Sundberg et al., 2012).

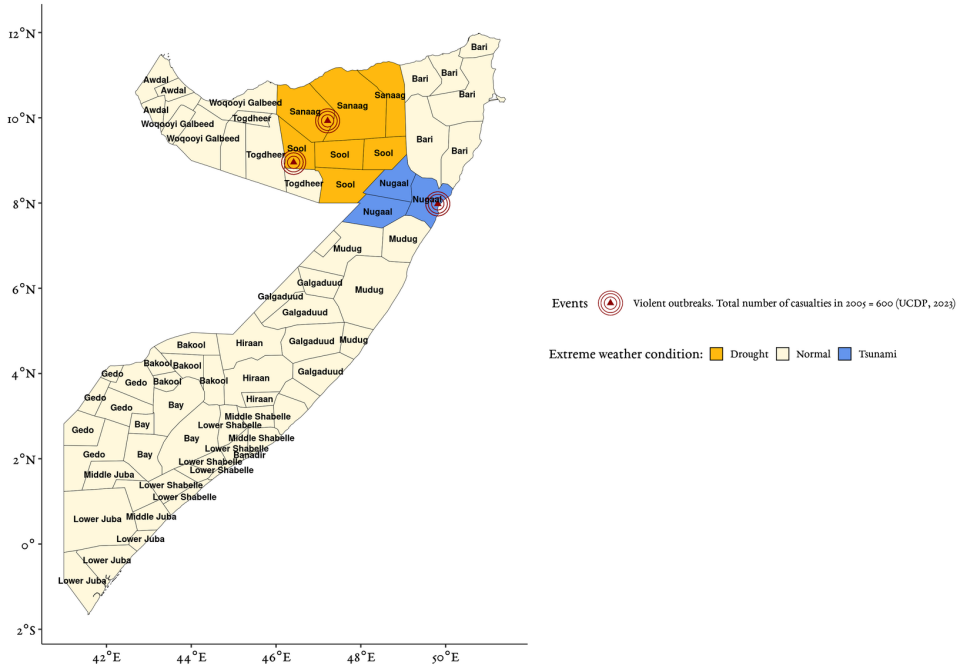

Figure 6.2: Distribution of violent outbreaks in Somalia

AGGRAVATION PERIOD (2004) A Somali TFG was established at the end of 2004. However, insecurity delayed the inauguration of the TFG until June 2005. There was a clear upsurge in violence in 2004. The formation of the TFG marked the end of the transitional period in Somalia, which culminated in AMISOM and Somali security forces taking control of Mogadishu (Lotze and Williams, 2016). During the previous year, humanitarian agencies were struggling to find a solution to one of the most catastrophic droughts in the last 20 years (United Nations, 2003). With the seasonal rain failing to arrive in Somalia, particularly in the northern parts of the country, the worsening effects of the drought triggered the degradation of pastures and the depletion of water supplies, which already acted as a stressor during the conflict (USAID, 2003).

The prolonged drought was followed by heavy rains and strong winds, which posed another serious threat. The particular link between climate hazards and security is diffused through 'famine, food insecurity, water scarcity and loss of livelihoods in Somalia' (Eklöw and Krampe, 2019). To further illustrate the adverse effects of climate change, the 2004 Indian Ocean tsunami severely affected "the northeast along a 650 km stretch of coastline from Xafuun in the Bari region to Garacad in the Mudug region" (United Nations Environment Programme, 2005).

The year 2004 marked the culmination of multiple climatic threats: the longest drought in 20 years, constant flood warnings in different parts of Somalia, and a tsunami (see Figure 6.2). Despite the formation of a new TFG, various competing factions and militias were trying to assert authority locally. Moreover, no strong state could suppress both the humanitarian consequences of climate-related disasters and the growing violence over scarce resources. As resource depletion accelerated (M2), tensions between various groups in Somalia also increased rapidly.

This chronological sequence fully confirms the first path to conflict exacerbation, as previously shown by csQCA: ECC* RS*RC, and follows the two mechanisms previously discussed. What this csQCA solution term suggests is a high level of exposure to the adverse effects of climate change (in this case, the intense droughts followed by floods) and a lack of stateness (between the end of the TNG mandate and the establishment of the TFG, Somalia exhibited a severe lack of stateness) against a backdrop of conflict over scarce resources (such as water).

POST-AGGRAVATION PERIOD (2005-2006) In 2005, the TFG split into two factions and came close to opening hostilities. In addition, according to the United Nations (2005), Somalia suffered a period of severe floods which completely destroyed some of the critical infrastructure (one of the two bridges in the southwest of Hargeisa in Somaliland was washed away) and power grids. Despite a period of reduced armed conflict, there is an intensified period of external support to local Somali 'clients' (which turns into full-scale intervention after 2006) (World Bank, 2005). The second mechanism (heightened scarcity) can be observed during this period.

MECHANISM RETRIEVED FROM THE TYPICAL CASE My findings are consistent with those of Maystadt and Ecker (2014), which links periods of drought to a 62% increase in the likelihood of local violence in Somalia. The period of conflict exacerbation (2004) is inextricably linked to a manifestation of climate-related adversities (droughts, floods and tsunamis). The mechanisms are visually summarized in Figure 6.3. The two mechanisms (see Figures 3.1-3.2) can be observed in the Somalian case. A resourcification of the conflict occurred in the

aggravation period, followed by a heightened scarcity mechanism in the post-aggravation period. This could partially account for a spike in violence (this time, interstate), where due to the adverse climatic impacts, securing access to resources that became even scarcer, could have fuelled an increase in violence.

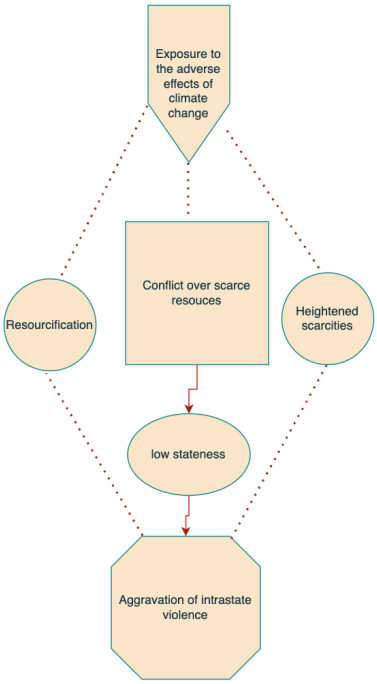

Figure 6.3: Mechanisms in the typical case, Somalia

6.2.2 Deviant case: Ethiopia's Insurgency in Ogaden-Aggravation but no exposure?

Ethiopia represents a deviant case because, although it exhibits the outcome (aggravation of violence), it lacks two fundamental conditions from my theoretical model that could explain the pathways to conflict: significant exposure to climate change and low stateness.

The available PRIO dataset indicates that the episodes of violence analysed take place between the government and the Ogaden National Liberation Front (ONLF), mostly in the Somali Regional State (SRS) of Ethiopia (also known as the Ogaden region). Since its liberation from Italian colonial rule by British forces in 1942, when it became independent, Ethiopia has been crippled by political change and turmoil.

Crucial to understanding the context in which recent episodes of violence have occurred is the adoption of a system of ethnic federalism in 1991, which created a framework of inclusion for multi-ethnic diversity (Bayu, 2021). However, the ethnic reality on the ground was difficult to manage, partly because of deep-rooted animosities. The case of the eastern part of Ethiopia, known as the Somali region, the Ogaden or the Somali National Regional State (SNRS), is a perfect example of minority grievances erupting into full-scale violence. The Somali region historically belonged to Somali sultans and came under Ethiopian administration in the 19th century, and remains under Ethiopian central administration despite the British push for political autonomy for Somalis in East Ethiopia after World War II (Hagmann, 2014). This is the origin story of the clashes between the ONLF and the Ethiopian government.

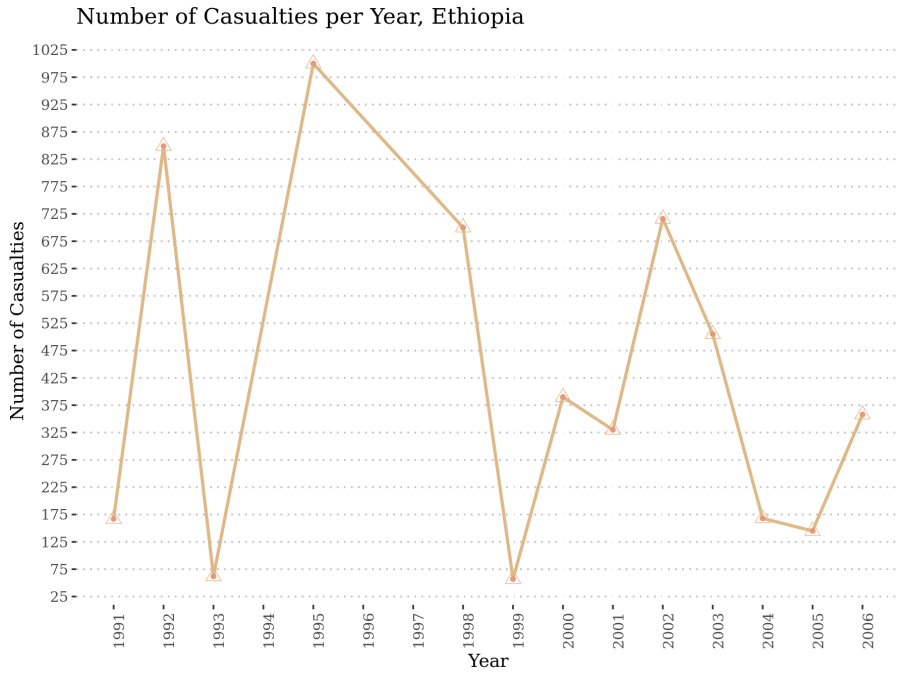

Figure 6.4: Number of casualties in Ethiopia

In 1991, following the collapse of the Derg regime, the Tigray People's Liberation Front (TPLF) came to power in Ethiopia. Its leadership was firm and ensured full control of the political system, but left no room for political opposition (Ali and Ylönen, 2022, 22). One such opposition group was the ONLF, which originated as a politico-military group representing the "ethno-nationalist interests of the Ogadeni in the face of an oppressive central government" (Ali and Ylönen, 2022). Following the footsteps of the more radical cells of the

ONLF, the organisation was prepared to engage in armed violence with governments from 1994 after its demand for a referendum on self-determination was rejected (Hagmann, 2014, 19).

A period of internal violence followed. Recalling figure 6.3., one may be tempted to believe that 1995 represented the peak of violence, which would be correct. But I distinguish between the peak and aggravation of violence, as the latter would imply a sudden surge in the clashes between the ONLF and the Ethiopian government that erupted shortly after the organisation declared its intention to negotiate with the central government for the right to self-determination. A decade of armed conflict followed, with reports of government forces killing civilians (Ali and Ylönen, 2022, 26).

There are several processes at play during this period that could explain the intensification of violence. First, the central government responded to these allegations by further concentrating the security apparatus in areas where the ONLF guerrillas operated, and committing crimes against anyone suspected of being a partisan of the secessionist group. A second process was the labelling of the ONLF as a terrorist organisation in the context of the war on terror doctrine. This intensified campaign, in turn, may have exacerbated the grievances of the challenger group.

The year 2005 marked a turning point in Ethiopia's violence.The months leading up to the elections saw an unprecedented mobilisation of opposition parties. After a poll by the National Election Board of Ethiopia (NEBE) showed the ruling Ethiopian People's Revolutionary Democratic Front (EPRDF) ahead in the polls, the opposition reacted violently, accusing the government of rigging the elections (Carter Center, 2005). This was followed by a protest by students in Addis Ababa who 'defied the government's ban on demonstrations' (Teshome, 2009). The clashes resulted in a total of 193 deaths and more than 40,000 arrests (Teshome, 2009). In the presence of international organisations and diplomats, the episode subsided after UN and EU-mediated efforts to get the parties to sign a non-violence pact.

The Ethiopian government framed ONLF's insurgencies as a national security threat. In July 2006, Ethiopia, backed by the United States, invaded Somalia, claiming that Somali ter-

rorists were responsible. It should be noted that apart from Ethiopia's desire to protect its 'national security', the government had strong economic interests in the region's 'oil and minerals'. The intervention ended three years later, in 2009, and the outcome was that Al-Shabab lost support and territory in Somalia.

I retrieve two processes:

Process 1: The mobilisation of challenger group in political opposition triggers a spike in violence due to the government wanting to gatekeep its position in power.

Process 2: Labelling the secessionist organisation as terrorist and backed by the U.S. fuelled an aggravation of violence, as a retaliatory response.

MECHANISM RETRIEVED FROM THE DEVIANT CASE :

Ethiopia may provide a model of how an increase in violence can be explained even in the absence of significant exposure to climate change, in the light of previously examined conditions. We can, thus understand the aggravation of violence in Ethiopia through the assistance received by the Somali minorities in the Somali region of Ethiopia, in conjunction with the central Ethiopian government being distracted by other episodes of violence as creating a window of opportunity. Ethiopia draws attention to a blind-spot of my proposed model: the disregarding of the external support received by the challenger groups, and potentially, by the governments as well, which could account for a violent outbreak. Therefore, future research should engage more thoroughly with the internationalization of conflicts. Equally important is the centrality of domestic group rivalries in secessionist conflicts. Here, a more thorough classification of intrastate violence, where the motivation of grievances is linked to certain manifestations of violence would provide a more accurate depiction of the mechanisms at play.

7 Conclusion

There are two pathways that account for the occurrence in the outcome (aggravation of intrastate violence) in the typical case. The first, ECC* RS*RC, describes a situation where conflict over scarce resources has been exacerbated after significant exposure to the adverse effects of climate change, combined with a lack of relative stateness. In the case of Somalia, this pathway is illustrated by the lack of institutional capacity, with the TFG unable to even enter Somali territory at the height of the violence. Furthermore, the second pathway implies that, given significant exposure to climate change, against the backdrop of a conflict over scarce resources and during a period of high political opportunity structure, an exacerbation of intrastate violence is to be expected. This pathway is not observed in the case of Somalia, where there was no high political opportunity structure 24 months prior to the increase in violence.

So, what does the unpacking of the mechanisms in the typical case of Somalia and the deviant case of Ethiopia tell us about the aggravation of violence during episodes of intrastate violence? Through identifying critical junctures, a pattern became evident in Somalia: the government's inability to legitimately diffuse violence in the context of a conflict over scarce resources following the worst drought in the country's 20-year history led to an increase in violence between militant groups and the newly established government. Two mechanisms were at work: First, the resourcification mechanism shows how the divide between the centralist and federalist camps in 2004 was inevitably clustered around key resources, and thus the lack of authority and scarce resources led to a resourcification of the conflict (Menkhaus, 2006). Subsequently, the second mechanism-exposure to the

significant effects of climate change, embodied in prolonged droughts, led to an heightened scarcity, which raised the cost of not securing access to the resources of interest (in this case, water).

In the case of Ethiopia, two conjunctural factors could explain a spike in violence: electoral violence during a period of transition, following a period of political mobilisation of an opposition that is in turn suppressed by the ruling government's ambitions to secure its access to power. The perceived disadvantage of the political opposition (composed of ethnically diverse members) in the face of drought-induced scarcity plays a central role in combination with the other factors.

What is revealed by the Ethiopian deviant case is that although the adverse effects of climate change were not a major driver of the increase in violence, a period of electoral transition (which coincides with a period of prolonged drought) represents a high opportunity structure. I have conceptualised and measured high political opportunity structures as having to do primarily with the irregular entry and exit of leaders from power. What the Ethiopian case highlights is that other electoral events may be perceived by opposing groups as providing opportunity frameworks that the challenger groups can capitalise on to gain access to resources.

The Ethiopian case reveals another pathway to aggravation: EF*RC*HTM. This would mean that a conflict over scarce resources could exhibit an outcome of aggravation when there is a highly territorial motivation behind it, and against the backdrop of a highly ethnically fractionalized society. In terms of our causal understanding of the conjunction, such a pathway sheds light on the importance of securing access to a (resource-abundant) territory for competing ethnic groups, which will increase the use of violence to attain that.

In future studies, opportunity structures should be conceptualized more broadly, moving away from a leader-centred view and being more sensitive to periods of power transitions. Furthermore, a blindspot of my model is that it cannot account for the internationalized dimension of violence. Here, It is crucial to conduct future research on how the posited mechanisms (M1, M2) diffuse in a context where violence transcends the intrastate realm and spills over neighbouring states, or it is aggravated by the intervention of a third party (as

it was the case of U.S' support in Ethiopia).

The empirical findings validate the main theoretical claim of this paper, that climate change augmented scarcity and resource dependency in post-1990 Africa, increasing the likelihood that competing ethnic groups will fight over scarce resources once they seize an opportune moment.

What should be done next? While the csQCA protocol provides cross-country evidence on the role of climate change in shaping resource conflicts, it lacks the within-case analysis needed to establish causality. Furthermore, the binary assessment of membership scores could be replaced by more complex protocols, such as a two-step fsQCA, which would allow researchers to have a more granular view of the remote and proximate conditions that might account for the exacerbation of violence. A more broad conceptualization of opportunity structures should follow.

Two broad conclusions can be drawn from this thesis, followed by two policy recommendations. The first conclusion is that the adverse effects of climate change will continue to act as stressors in episodes of intrastate violence unless we put in place safeguards that would mitigate the damage (e.g. early warning systems). Second, the resourcification of conflicts is an inevitable process as resources become scarcer over time, and when this happens, it will become too costly for opposing ethnic groups not to secure access to these resources due to the increased impacts of climate change that will trigger greater scarcity.

What can be done? The case of Somalia informs a first policy recommendation: investment and capacity building in institutions is the backbone of dealing with outbreaks of violence. But having a legitimate federal government may be more difficult in practice, as secessionist groups will continue to challenge a government that is unwilling to listen to their demands. A second recommendation, and perhaps what I find most interesting in this research, is that in times of high political opportunity structure (remember, not only at the leadership level but also at the local level), against a backdrop of perceived scarcity and prolonged drought, violence is more likely to escalate. Here, external election observation missions could mediate the electoral transition by credibly signalling their presence as an impartial but present third party, which could prevent the escalation of violence.

BIBLIOGRAPHY

Achen, C. H. (2005). Let's put garbage-can regressions and garbage-can probits where they belong. *Conflict Management and Peace Science*, *22*(4), 327–339.

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

Ali, N. M., and Ylönen, A. (2022). External actors and dynamics. *Routledge Handbook of the Horn of Africa*, 98.

Anckar, C. (2008). On the applicability of the most similar systems design and the most different systems design in comparative research. *International Journal of Social Research Methodology*, *11*(5), 389–401.

Barnett, J., and Adger, W. N. (2007). Climate change, human security and violent conflict. *Political geography*, *26*(6), 639–655.

Bayu, T. B. (2021). Ethnic conflict in ethiopia: Federalism as a cause and solution. *Religación: Revista de Ciencias Sociales y Humanidades*, *6*(30), 1.

Beach, D., and Rohlfing, I. (2018). Integrating cross-case analyses and process tracing in set-theoretic research: Strategies and parameters of debate. *Sociological Methods & Research*, *47*(1), 3–36.

Beaumont, P., and Coning, C. d. (2022). Coping with complexity: Toward epistemological pluralism in climate–conflict scholarship. *International Studies Review*, *24*(4), viac055.

Braithwaite, A., and Lemke, D. (2011). Unpacking escalation. *Conflict Management and Peace Science*, *28*(2), 111–123.

Brander, J. A., and Taylor, M. S. (1998). The simple economics of easter island: A ricardo-malthus model of renewable resource use. *American economic review*, 119–138.

Bretthauer, J. M. (2015). Conditions for peace and conflict: Applying a fuzzy-set qualitative comparative analysis to cases of resource scarcity. *Journal of Conflict Resolution*, *59*(4), 593–616.

Busby, J. (2018). Taking stock: The field of climate and security. *Current Climate Change*

Reports, *4*(4), 338–346.

Buzan, B. (1997). Rethinking security after the cold war. *Cooperation and conflict*, *32*(1), 5–28.

Capoccia, G., and Kelemen, R. D. (2007). The study of critical junctures: Theory, narrative, and counterfactuals in historical institutionalism. *World politics*, *59*(3), 341–369.

Carter Center. (2005). *Ethiopia 2005: Final Report*. Carter Center. Retrieved from https://www.cartercenter.org/resources/pdfs/news/peace_publications/election_reports/ethiopia-2005-finalrpt.pdf

Civins, B. (2010). Ethiopia's intervention in somalia 2006-2009. *Journal of International Studies*, *2*(2), 121–138.

Clarke, K. A. (2005). The phantom menace: Omitted variable bias in econometric research. *Conflict management and peace science*, *22*(4), 341–352.

Clarke, K. A. (2009). Return of the phantom menace: Omitted variable bias in political research. *Conflict Management and Peace Science*, *26*(1), 46–66.

Cleveland, C. J., and Ruth, M. (1997). When, where, and by how much do biophysical limits constrain the economic process? a survey of nicholas georgescu-roegen's contribution to. *Ecological economics*, *22*, 203–223.

Collier, P., Hoeffler, A., and Söderbom, M. (2004). On the duration of civil war. *Journal of peace research*, *41*(3), 253–273.

Dražanová, L. (2020). Introducing the historical index of ethnic fractionalization (hief) dataset: accounting for longitudinal changes in ethnic diversity. *Journal of open humanities data*, *6*.

Eklöw, K., and Krampe, F. (2019). *Climate-related security risks and peacebuilding in somalia* (Report No. Part Title: Conflicts and peacebuilding efforts in Somalia). Stockholm International Peace Research Institute.

Evans, A. (2011). Resource scarcity, climate change and the risk of violent conflict.

Falkner, R. (2016). The paris agreement and the new logic of international climate politics. *International Affairs*, *92*(5), 1107–1125.

Feindouno, S., Guillaumont, P., and Simonet, C. (2020). The physical vulnerability to climate change index: An index to be used for international policy. *Ecological Economics*, *176*, 106752.

Gleditsch, N. P. (2012). *Whither the weather? climate change and conflict* (Vol. 49) (No. 1). Sage Publications Sage UK: London, England.

Gleick, P. H., and Heberger, M. (2014). Water conflict chronology. In *The world's water* (pp. 173–219). Springer.

Graham, O. L. (2000). *Environmental politics and policy, 1960s-1990s* (Vol. 9). Penn State Press.

Gupta, J. (2010). A history of international climate change policy. *Wiley Interdisciplinary Reviews: Climate Change*, *1*(5), 636–653.

Hagmann, T. (2014). Talking peace in the ogaden. *The Search for an End to Conflict in the Somali Regional State in Ethiopia, London–Nairobi*.

Hendrix, C. S., and Glaser, S. M. (2007). Trends and triggers: Climate, climate change and civil conflict in sub-saharan africa. *Political geography*, *26*(6), 695–715.

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

Hendrix, C. S., and Salehyan, I. (2017). A house divided: Threat perception, military factionalism, and repression in africa. *Journal of Conflict Resolution*, *61*(8), 1653–1681.

Homer-Dixon, T. F. (1991). On the threshold: environmental changes as causes of acute conflict. *International security*, *16*(2), 76–116.

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

Ide, T. (2015a). *Towards methodological pluralism: An empirical evaluation of research methods for assessing the link between climate change and violent conflict* (Unpublished doctoral dissertation). Universität Hamburg Hamburg.

Ide, T. (2015b). Why do conflicts over scarce renewable resources turn violent? a qualitative comparative analysis. *Global Environmental Change*, *33*, 61–70.

Ide, T. (2017). Research methods for exploring the links between climate change and conflict. *Wiley Interdisciplinary Reviews: Climate Change*, *8*(3), e456.

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

Ide, T., Johnson, M. F., Barnett, J., Krampe, F., Le Billon, P., Maertens, L., ... Vélez-Torres, I. (2023). The future of environmental peace and conflict research. *Environmental Politics*, 1–27.

Ide, T., Kristensen, A., and Bartusevičius, H. (2021). 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.

Ide, T., and Mello, P. A. (2022). Qca in international relations: A review of strengths, pitfalls, and empirical applications. *International Studies Review*, *24*(1), viac008.

Intergovernmental Panel on Climate Change. (2023). *The sixth assessment report of the IPCC* (Special Events). Author. (Each IPCC Assessment Report is composed of contributions by the three IPCC Working Groups and a Synthesis Report. Contributions to the IPCC Sixth Assessment Report (AR6) were published over 2021–2023.)

Koubi, V. (2019). Climate change and conflict. *Annual Review of Political Science*, *22*, 343–360.

Levin, K., Cashore, B., Bernstein, S., and Auld, G. (2012). Overcoming the tragedy of super wicked problems: constraining our future selves to ameliorate global climate change. *Policy sciences*, *45*, 123–152.

Levy, J. S. (2008). Case studies: Types, designs, and logics of inference. *Conflict management and peace science*, *25*(1), 1–18.

Lotze, W., and Williams, P. (2016). The surge to stabilize: Lessons for the un from the au's experience in somalia. *Walter Lotze and Paul D. Williams,"The Surge to Stabilize: Lessons for the UN from the AU's Experience in Somalia" New York: International Peace Institute*.

Mach, K. J., Kraan, C. M., Adger, W. N., Buhaug, H., Burke, M., Fearon, J. D., ... others (2019). Climate as a risk factor for armed conflict. *Nature*, *571*(7764), 193–197.

Mahoney, J., and Goertz, G. (2006). A tale of two cultures: Contrasting quantitative and qualitative research. *Political analysis*, *14*(3), 227–249.

Marx, A., and Dusa, A. (2011). Crisp-set qualitative comparative analysis (csqca), contradictions and consistency benchmarks for model specification. *Methodological innovations online*, *6*(2), 103–148.

Maxwell, J. W., and Reuveny, R. (2000). Resource scarcity and conflict in developing countries. *Journal of peace Research*, *37*(3), 301–322.

Maystadt, J.-F., and 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.

Menkhaus, K. (2006). Governance without government in somalia: Spoilers, state building, and the politics of coping. *International security*, *31*(3), 74–106.

Menkhaus, K. (2011). Stabilisation and humanitarian access in a collapsed state: the somali case. *Disasters*, *35*(4), 737–761. (Correspondence) doi: 10.1111/j.1467-7717.2010.01204.x

Møller, J., and Skaaning, S.-E. (2010). Beyond the radial delusion: Conceptualizing and measuring democracy and non-democracy. *International Political Science Review*, *31*(3), 261–283.

Oana, I.-E., Schneider, C. Q., and Thomann, E. (2021). *Qualitative comparative analysis using r: A beginner's guide*. Cambridge University Press.

Osman, A. (undated). *Cultural diversity and the somali conflict: Myth or reality?* Governance, Human Rights.

Pielke Sr, R. A. (2013). *Climate vulnerability: understanding and addressing threats to essential resources*. Elsevier.

Prskawetz, A., Feichtinger, G., and Wirl, F. (1994). Endogenous population growth and the exploitation of renewable resources. *Mathematical Population Studies*, *5*(1), 87–106.

Ragin, C. C. (1987). *The comparative method: Moving beyond qualitative and quantitative strategies*. JSTOR.

Rihoux, B., and Ragin, C. C. (2008). *Configurational comparative methods: Qualitative comparative analysis (qca) and related techniques*. Sage Publications.

Rustad, S. A., and Binningsbø, H. M. (2012). A price worth fighting for? natural resources

and conflict recurrence. *Journal of Peace Research*, *49*(4), 531–546.

Saini, M., and Hrušecká, D. (2021). Comparative impact of logistics performance index, ease of doing business and logistics cost on economic development: a fuzzy qca analysis. *Journal of Business Economics and Management*.

Salehyan, I., and Hendrix, C. S. (2014). Climate shocks and political violence. *Global Environmental Change*, *28*, 239–250.

Scheffran, J., Brzoska, M., Kominek, J., Link, P. M., and Schilling, J. (2012a). Climate change and violent conflict. *Science*, *336*(6083), 869–871.

Scheffran, J., Brzoska, M., Kominek, J., Link, P. M., and Schilling, J. (2012b). Disentangling the climate-conflict nexus: Empirical and theoretical assessment of vulnerabilities and pathways. *Rev. Eur. Stud.*, *4*, 1.

Schneider, C. Q., and Rohlfing, I. (2013). Combining qca and process tracing in set-theoretic multi-method research. *Sociological Methods & Research*, *42*(4), 559–597.

Schneider, C. Q., and Wagemann, C. (2012). *Set-theoretic methods for the social sciences: A guide to qualitative comparative analysis*. Cambridge University Press.

Seawright, J., and Gerring, J. (2008). Case selection techniques in case study research: A menu of qualitative and quantitative options. *Political research quarterly*, *61*(2), 294–308.

Skrede-Gleditsch, K., and Ruggeri, A. (2010). Political opportunity structures, democracy, and civil war. *Journal of Peace Research*, *47*(3), 299–310.

Sundberg, R., Eck, K., and Kreutz, J. (2012). Introducing the ucdp non-state conflict dataset. *Journal of peace research*, *49*(2), 351–362.

Teshome, W. (2009). Electoral violence in africa: experience from ethiopia. *International journal of Humanities and social sciences*, *3*(7), 1653–1677.

Theisen, O. M., Holtermann, H., and Buhaug, H. (2011). Climate wars? assessing the claim that drought breeds conflict. *International Security*, *36*(3), 79–106.

Toft, M. D. (2014). Territory and war. *Journal of Peace Research*, *51*(2), 185–198.

United Nations. (2003, December 22). UN Feeds Drought-Stricken Somalis Threatened by Famine. Retrieved from https://news.un.org/en/story/2003/12/89612

United Nations. (2005, April 26). *Floods Hit Ethiopia, Somalia* (No. AFR/1145-IHA/1039). (Press Release)

United Nations Environment Programme. (2005). *The State of the Environment in Somalia: A Desk Study* (Tech. Rep.). United Nations Environment Programme.

Urdal, H. (2008). Population, resources, and political violence: A subnational study of india, 1956–2002. *Journal of Conflict Resolution*, *52*(4), 590–617.

USAID. (2003, November 12). *Africa: Drought and Floods Hazards Assessment*. Retrieved from https://reliefweb.int/report/somalia/africa-drought-and-floods-hazards-assessment-12-nov-2003

Von Uexkull, N., and Buhaug, H. (2021). *Security implications of climate change: A decade of*

scientific progress (Vol. 58) (No. 1). SAGE Publications Sage UK: London, England.

Wagemann, C. (2014). Qualitative comparative analysis (qca): what it is, what it does, and how it works. In *Methodological practices in social movement research.* Oxford University Press.

Waldner, D. (2012). Process tracing and causal mechanisms. *The oxford handbook of philosophy of social science*, 65–84.

World Bank. (2005). *Conflict in Somalia: Drivers and Dynamics* (Tech. Rep.). World Bank.

APPENDIX A. REPLICATION FILES

Data, R code, and all other necessary replication files and materials can be found at:
https://github.com/romanletitia/thesisceu2023

APPENDIX B. LIST OF CASES AND MEMBERSHIP SCORES

Filter

	COUNTRY	YEAR	OUTCOME	EF	RS	RD	ECC	RC	HPO	HTM
1	Algeria	1991	0	0	1	0	0	0	1	0
2	Angola	1998	0	1	1	0	0	1	0	0
3	Angola	1994	0	1	1	0	0	1	0	0
4	Angola	1991	0	1	1	0	0	1	0	0
5	Angola	2002	0	1	1	0	0	1	0	0
6	Burundi	1991	0	0	1	1	0	0	1	0
7	Central African Republic	2006	0	1	0	0	0	1	0	0
8	Central African Republic	2001	0	1	0	1	0	0	0	0
9	Chad	1997	1	1	0	1	1	1	0	1
10	Chad	2005	1	1	0	1	1	1	0	1
11	Comoros	1997	0	0	1	0	0	0	1	1
12	Congo-Brazzaville	2002	1	1	0	0	0	1	0	0
13	Congo-Brazzaville	1993	0	1	0	0	0	0	0	0
14	Congo-Brazzaville	1997	1	1	0	0	0	1	1	0
15	Djibouti	1991	0	0	0	1	1	0	0	0
16	Djibouti	1999	0	0	0	0	1	0	0	0
17	Eritrea	2003	0	0	0	1	1	0	0	1
18	Eritrea	1997	0	0	0	0	1	0	0	1
19	Ethiopia	1996	1	1	0	0	0	1	0	1
20	Ethiopia	1996	0	1	0	0	0	1	0	1
21	Ethiopia	1996	0	1	0	0	0	0	0	1
22	Guinea	2000	0	0	1	0	0	0	0	0
23	Guinea-Bissau	1998	0	0	1	0	0	0	1	1
24	Ivory Coast	2002	0	1	0	0	0	1	1	0
25	Liberia	2000	0	1	0	0	0	1	0	0
26	Mali	1994	1	1	1	0	1	1	0	1
27	Mali	1990	1	1	1	1	1	1	1	0
28	Niger	1992	0	0	1	0	1	0	1	0
29	Niger	1997	1	0	1	0	1	0	1	0
30	Niger	1996	1	0	1	0	1	1	1	0
31	Nigeria	2004	0	1	1	0	1	0	0	1
32	Nigeria	2004	0	1	1	0	1	1	0	1
33	Rwanda	1990	0	0	1	1	0	1	0	0
34	Rwanda	1997	0	0	1	0	0	1	0	0
35	Senegal	1990	0	1	1	1	1	1	0	1
36	Senegal	2003	0	1	1	0	1	1	0	1
37	Sierra Leone	1991	0	1	1	1	0	1	1	0
38	Somalia	2001	1	1	0	0	1	1	0	1
39	Togo	1991	0	1	1	0	0	0	0	1
40	Uganda	1994	0	1	1	0	0	0	0	0
41	South Sudan	2013	1	1	1	0	0	1	0	1
42	Central African Republic	2012	0	1	0	1	0	1	1	1
43	Libya	2014	0	0	0	0	1	0	1	1
44	Mali	2012	1	1	1	1	1	1	1	1
45	Sudan	2003	0	1	0	1	1	0	0	1

Figure 7.1: Cases for csQCA

APPENDIX C. TRUTH TABLE

	ECC	EF	RS	RD	RC	HPO	HTM	OUT	n	incl	PRI	cases
54	0	1	1	0	1	0	1	1	1	1.000	1.000	41
87	1	0	1	0	1	1	0	1	1	1.000	1.000	30
102	1	1	0	0	1	0	1	1	1	1.000	1.000	38
110	1	1	0	1	1	0	1	1	2	1.000	1.000	9,10
127	1	1	1	1	1	1	0	1	1	1.000	1.000	27
128	1	1	1	1	1	1	1	1	1	1.000	1.000	44
38	0	1	0	0	1	0	1	0	2	0.500	0.500	19,20
39	0	1	0	0	1	1	0	0	2	0.500	0.500	14,24
83	1	0	1	0	0	1	0	0	2	0.500	0.500	28,29
37	0	1	0	0	1	0	0	0	3	0.333	0.333	7,12,25
118	1	1	1	0	1	0	1	0	3	0.333	0.333	26,32,36
17	0	0	1	0	0	0	0	0	1	0.000	0.000	22
19	0	0	1	0	0	1	0	0	1	0.000	0.000	1
20	0	0	1	0	0	1	1	0	2	0.000	0.000	11,23
21	0	0	1	0	1	0	0	0	1	0.000	0.000	34
27	0	0	1	1	0	1	0	0	1	0.000	0.000	6
29	0	0	1	1	1	0	0	0	1	0.000	0.000	33
33	0	1	0	0	0	0	0	0	1	0.000	0.000	13
34	0	1	0	0	0	0	1	0	1	0.000	0.000	21
41	0	1	0	1	0	0	0	0	1	0.000	0.000	8
48	0	1	0	1	1	1	1	0	1	0.000	0.000	42
49	0	1	1	0	0	0	0	0	1	0.000	0.000	40
50	0	1	1	0	0	0	1	0	1	0.000	0.000	39
53	0	1	1	0	1	0	0	0	4	0.000	0.000	2,3,4,5
63	0	1	1	1	1	1	0	0	1	0.000	0.000	37
65	1	0	0	0	0	0	0	0	1	0.000	0.000	16
66	1	0	0	0	0	0	1	0	1	0.000	0.000	18
68	1	0	0	0	0	1	1	0	1	0.000	0.000	43
73	1	0	0	1	0	0	0	0	1	0.000	0.000	15
74	1	0	0	1	0	0	1	0	1	0.000	0.000	17
106	1	1	0	1	0	0	1	0	1	0.000	0.000	45
114	1	1	1	0	0	0	1	0	1	0.000	0.000	31
126	1	1	1	1	1	0	1	0	1	0.000	0.000	35

Figure 7.2: Truth table for csQCA